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Original Research Article

Neurological Disorders In Hypothyroidism: An observational study on recently detected hypothyroid patients

Dhermendra Pratap Singh[1], Amitabh Sharma[2], N K Soni[3], B P S Tyagi[4]
[1]Assistant Professor, Department of Medicine, Saraswathi Institute of Medical Sciences, Hapur, Ghaziabad,
[2]Senior Resident, Yashoda Hospital, Nehru Nagar, Ghaziabad, Uttar Pradesh
[3]Senior consultant Physician, Yashoda Hospital, Nehru Nagar, Ghaziabad, Uttar Pradesh
[4]ENT and Head and Neck Surgeon, Yashoda Hospital, Nehru Nagar, Ghaziabad, Uttar Pradesh

***Corresponding author**
Dhermendra Pratap Singh
Email: dpsingh87@yahoo.com

Abstract: Endocrinal diseases especially, hypothyroidism can present with a wide variety of symptoms pertaining to different bodily systems and can lead to, at times, in diagnostic delays and dilemmas. This study was done to evaluate the clinical aspects, investigations and therapy of this disease and to make clinician familiar with the common neurological presentations in such patients. We conducted this study on 50 patients of 16-60 year age group with hypothyroidism .Detailed clinical evaluation was combined with electrophysiological and radiological evaluation. Out of 50 patients who fulfilled the criteria for study 34% were male and 66% were female. Average age of the participants was 40.3 years and average weight of patients was 62.5 kg. Complaint of pain in hand was present in 46%, paresthesia in hand in 54% of patients, sensory loss in hand and muscle cramps were 52% and 48% respectively. Complaints of nervousness, tinnitis and hearing impairment were present in 52%, 36% and 30% of the patients. Tests like Electrophysiology suggested that about 60% of the total assessed patients had positive electrophysiological findings, of which 63.3% were female subjects and 36.7% were male subjects. Where as in Audiometry test, only 34% patient tested positive for sensory neural hearing loss (SNHL) of which 52.9% were females and 47.1% were males. Neuroimaging test showed only 10% of total patients tested positive, of which ,again female percentage was more than males 66% and 34% respectively. Phallen's sign was elicited in 30% of the total patients, of which 60% were female and 40% were male. In this study neuromuscular symptoms and signs were present in most patients. About 52% of the hypothyroid patients had predominantly signs of neuromuscular disorder in the course of thyroid disease. This study is suggestive of that most patients who are diagnosed with Hypothyroidism also have neurological manifestations. These data can help the clinicians to detect these neurological findings and associate them with hypothyroidism for early initiation and management of patient complaints.
Keywords: Hypothyroidism, Neurological Manifestations, Electrophysiology.

INTRODUCTION

Endocrine diseases have protean manifestations and present with a wide variety of symptoms pertaining to different bodily systems. This results, at times, in diagnostic delays and dilemmas; hence it is important for the clinician to be familiar with the neurological manifestations of endocrinopathies. Amongst various endocrinal disorders, hypothyroidism is common and to an extent, encountered frequently in clinical practice. This study was done to evaluate the symptomatology clinical aspects, investigations and therapy of this disease.

An important role is played by the thyroid gland in tissue metabolism and development. It secretes thyroxin (3,5,3'5'-tetraiodothyronine), which is abbreviated as T4, and small amounts of 3,5,3'-triiodothyronine, abbreviated T3. Thyroid hormones regulate protein synthesis by affecting gene transcription and mRNA stabilization. Both have systemic effects. Inadequate thyroid hormone levels leads to hypothyroidism. Inadequate thyroid hormone during development leads to congenital hypothyroidism (also known as cretinism) is associated with irreversible brain damage. Hypothyroidism in both child and adult can lead to affection of brain, peripheral nerve and muscles [1, 2].

The aims of this study were to investigate the prevalence of neuromuscular signs and symptoms in patients with newly diagnosed hypothyroidism; and to

evaluate electro-diagnostic evidence of neuromuscular dysfunction.

MATERIAL AND METHODS

This study was conducted at Yashoda superspeciality hospital, Ghaziabad. The hospital caters to around 3900 patients each year in (IPD). In patient department and around 18500 in (OPD) Outpatient department .The study was conducted on patient diagnosed to have hypothyroidism, both In Outpatient department and In patient department from December 2008 to December 2010.

Inclusion Criteria

- Any patient in age group 16- 60 diagnosed to have Hypothyroidism according to biochemical criteria was evaluated in detail clinically and with other investigations.
- Biochemical criteria of American Thyroid Association Guidelines for Detection of Thyroid Dysfunction were followed. [3] Reference range of TSH, T3 and T4 at Yashoda Hospital: is TSH: 0.49 - 4.67 uIU/ml T 3: 0.95 - 2.5 mmo1/1 T4: 60.0-150.0 mmol/1.

Exclusion Criteria

- Age < 16 years and > 60 years.
- Other possible causes of neuropathy or neuromuscular diseases (for example, diabetes mellitus, alcoholism, liver and kidney disease, use of drugs known to cause neuropathy or myopathy, malignancy, or other serious illness (for example, cardiac failure or HIV infection), a family history of neuropathy.

Thyroid profile estimation was done in Department of Biochemistry, Yashoda super Specialty Hospital. Estimation was done by a fully automated Biochemistry Analyzer ABBOTT AxSYM. For Thyroid Profile estimation 2.0 ml of blood is required. This blood is then subjected to centrifugation, and then the serum obtained is put in ABBOTT AxSYM SYSTEM

For the neurological history a standardized symptom questionnaire was used with special attention given to sensory symptoms, weakness, cramps, muscle pain, fatigability, and difficulty climbing stairs, and rising from a low seat. Duration of symptoms was estimated in months before referral. Finally, the patients were asked whether neuromuscular symptoms, when present, were their first or main complaint(s).

The clinical neurological examination was performed by one experienced examiner (RFD), who was not blinded to the diagnosis hypothyroidism, because of the often evident clinical signs that suggested the diagnosis. In addition to thyroid dysfunction, patient having paresthesia, muscle paresis, wasting or weakness were subjected for Nerve Conduction Velocity Test (NCV) and Electromyography (EMG). In patients having Headache, drowsiness, altered behavior, central nervous system defect, visual complaint were subjected for Imaging including MRI Brain or CT Head. In patient having swelling in neck, neck pain, changes in voice were subjected to Direct and/ or indirect laryngoscopy. In patient having hearing impairment /tinnitus were subjected to Pure tone Audiometry.

The data was analyzed with the help of Epi-Info version 6.0 & Microsoft Excel for Windows.

Chi-square test was used to ascertain statistical significance among the proportions. A p-value of <0.05 was considered as statistically significant unless mentioned otherwise .Confounding factors was dealt with appropriate method of adjustment.

OBSERVATIONS

Clinical findings are summarized in Table 1 and 2. Investigations results are compiled in Table 3.

Table-1: Clinical Symptoms

Clinical Symptoms	Number of patients with positive history	Number of patients with negative history	Percentage of total no. of patients with positive history
Fatigue , exhaustion	34	16	68
Feeling run down and sluggish	27	23	54
Depression	29	21	58
Difficulty in concentration	17	33	34
Unexplained or excessive weight gain	13	37	26
Dry , coarse or itchy skin	13	37	26
constipation	30	20	60
Muscle cramps	24	26	48
Nervousness	26	24	52
Irritability	31	19	62
Paresthesias excluding hands (numbness, tingling, burning)	23	27	46
Pain in hand	23	27	46
Paresthesias in hand(numbness, tingling, burning)	27	23	54

Table-2: Clinical signs

Clinical signs	Number of patients with positive finding	Number of patients with negative finding	Percentage of total no. of patients with positive finding
Hearing impairment	15	35	30
Tinnitus	18	32	36
Muscle weakness excluding hands	18	32	36
Sensory impairment	14	36	28
Weakness in hand	15	35	30
Phallen's sign	15	35	30
Sensory loss in hands	26	24	

Table-3: Investigations

Investigation	No. of patients with abnormal finding	No. of patients with normal report	Percentage of total no. of patients with abnormal finding
Electrophysiology	30	20	60
NCV-Positive for CTS	31	19	62
Audiometry	17	33	34
Laryngoscopy	3	47	06
Neuroimaging	5	45	10

DISCUSSION

Total numbers of patients approached were 62 who were diagnosed with hypothyroidism and were fulfilling the criteria for study. Out of which 50 patients agreed and gave consent for the study as the rest did not give consent for different reasons.

Out of 50 patients who fulfilled the criteria for study 34% were male and 66% were female. Average age of the participants was 40.3 years and average weight of patients was 62.5 kg. Out of the 65 patients studied by D Raju *et al*. male: female ratio was 1:8, 58.46% of patients were middle aged. [4] Other studies have also reported that females are more commonly affected especially in middle age [5- 8].

Our study was suggestive of that most patients who are diagnosed with Hypothyroidism also have neurological manifestations. This is evident from results of this study in which complaint of pain in hand was present in 46% of total assessed patients. Paresthesia in hand was present in 54% of patients. The complaints of sensory loss in hand and muscle cramps were 52% and 48% respectively. It was also seen that in hypothyroid patient's complaints of nervousness, tinnitus and hearing impairment were present in 52%, 36% and 30% of the patients. These complaints when subjected to various tests gave confirmatory evidence of prevalence of various neurological dysfunctions in hypothyroid patients. D Raju *et al*. also reported about neurological features. The symptoms in decreasing frequency in their study included tiredness (95.38%), change in voice (61.54%), body ache (52.31%), psychiatric manifestations (24.62%), altered sensorium (6.15%) and seizures (4.62%) [4]. Cakir M *et al*. reported in their study on 137 patients that musculoskeletal disorders often accompany thyroid dysfunction. They noticed Dupuytren's contracture, limited joint mobility and carpal tunnel syndrome were commonest involvement among their patients (21.7%, 8.7% and 30.4%, respectively) [9].

Other authors have also observed that an awareness for musculo-skeletal manifestation in hypothyroidism is prudent as this system is easy to miss in view of many times subtle involvement in early cases [10-12].

Tests like Electrophysiology suggested that about 60% of the total assessed patients had positive electrophysiological findings, of which 63.3% were female subjects and 36.7% were male subjects, which is quite a significant proportion of patients. Similarly tests for Carpel Tunnel Syndrome also suggested that about 62% of the patients tested positive for CTS, of which 61.3% were female subjects and 38.7% were male subjects.

Where as in Audiometry test, only 34% patient tested positive for sensory neural hearing loss (SNHL) of which 52.9% were females and 47.1% were males. Meyerhoff WL has reported that there is both clinical and laboratory evidence that hearing loss can result from congenital and acquired hypothyroidism. The reversibility of this process, however, and its incidence and pathophysiology are not universally agreed upon) [13].

Neuroimaging test showed only 10% of total patients tested positive, of which again female percentage was more than males 66% and 34% respectively. Similarly Phallen's sign was elicited in 30% of the total patients, of which 60% were female and 40% were male. In this study neuromuscular

symptoms and signs were present in most patients. About 52% of the hypothyroid patients had predominantly signs of neuromuscular disorder in the course of thyroid disease. In the literature the prevalence of abnormal findings found in neuromuscular investigations in thyroid dysfunctions varies between 20% and 80 % [13-16].

Weakness in hypothyroidism is more difficult to treat, suggesting myopathy. Hypothyroidism causes signs and symptoms of neuromuscular dysfunction. Hypothyroidism has been associated with the clinical features of myopathy (for example, proximal muscle weakness) [16], mononeuropathy, and sensorimotor polyneuropathy [17].

The reported prevalence of these signs and symptoms is variable. Few prospective studies on this topic have been performed [18, 19]. In retrospective studies, published in the early 1980s, the prevalence of neuropathy in hypothyroid patients varied between 10% and 70% and that of myopathy between 20% and 80 %) [16, 20].

The neurological manifestations obtained in this study affirm and support the hypothesis that hypothyroidism causes neurological dysfunctions which causes a lot of suffering and frequent visits by the patient to the doctor. These data would help the clinicians to detect these neurological findings and associate them with hypothyroidism for early initiation and management of patient complaints.

CONCLUSION

Amongst various endocrinal disorders, the thyroid diseases are quite common and encountered frequently in clinical practice. This article highlights the symptomatology clinical aspects, investigations and therapy of these diseases. Clinicians must be able to identify characteristic neurologic deficits of thyroid disease so as to predict and possibly prevent neurologic complications. In this study neuromuscular symptoms and signs were present in most patients. Most of the hypothyroid patients had predominantly signs of neuromuscular disorder in the course of thyroid disease. The prevalence of neuromuscular disorders in thyroid dysfunctions varies in the literature between 20% and 80%.

The neurological manifestations obtained in this study affirm and support the hypothesis that hypothyroidism causes neurological dysfunctions which causes a lot of suffering and frequent visits by the patient to the doctor. These data would help the clinicians to detect these neurological findings and associate them with hypothyroidism for early initiation and management of patient complaints. We conclude that neuromuscular symptoms and signs occur in most diagnosed patients with thyroid disease.

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