DOI: https://doi.org/10.53350/pjmhs2023173658

ORIGINAL ARTICLE

Prevalence of Cerebellar Ataxia in Patients with Hypothyroidism

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ABSTRACT

Objectives: To determine the prevalence of cerebellar Ataxia in patients with hypothyroidism.

Materials and Methods: The design of this study was cross sectional study design and this study was conducted in Shaheed Mohtarma Benazir Bhutto Medical University, Larkana. This study was conducted in the duration of 6 months from July 2022–Dec 2022. Total 13 patients with hypothyroidism were enrolled. Routine blood investigation and Thyroid Function Tests were done for all patients. MRI was done for all patients in order to rule out demyelinating, vascular and structural causes of cerebellar ataxia. All the data was collected in predesigned questioner.

Results: A total of 13 patients with mean age of 50.92±11.21 years were enrolled. Out of total, 69.2% patients were male and 30.8% patients were female. Clinical characteristics of enrolled patients are given in table 1-0. The mean and SD value of T3, T4 and TSH were 50.9±11.21, 2.80±0.63 and 77.30±10.57 respectively. The TPO antibodies test were performed that shows mean value of 31.15±3.38, that fall in normal range. And MRI brain was also normal. Distribution of patients on the basis of Ataxia was done and it was found that 4 (30.8%) had ataxia.

Practical implication: This study will help the clinical practitioner to keep in mind that there is chance of ataxia in patients suffering from hypothyroidism. So the clinical practitioner should take care of the patients to avoid such complication. There is evidence that the ataxia has been reversed by thyroid replacement therapy.

Conclusion: It is concluded that Hypothyroidism is responsible to cause cerebellar ataxia. Therefore early treatment should be taken to avoid this manifestation.

Keywords: Cerebellar Ataxia, hypothyroidism**,** Thyroid Function Tests

INTRODUCTION

Hormonal imbalances can affect the cerebellum[(1)]. Thyroid disorders are the primary endocrine conditions connected to cerebellar ataxia[(2)]. Both hypothyroidism and hyperthyroidism can cause cerebellar symptoms in both children and adults[(3)]. Hypothyroidism is a common medical condition in the general population [(4)]. The general population frequently suffers from symptoms of hypothyroidism which includes fatigue, constipation, aversion to the cold, gaining weight, hair loss, dry skin, and hoarseness are some of its typical systemic symptoms. Patients with hypothyroidism may have a range of central and peripheral nervous system manifestations. Some patients may experience symptoms and signs of neurologic dysfunction, which can lead to serious disability. The majority of these issues respond either completely or partially to thyroxine substitution (1).In 1960 Jellinekand Kelly published their paper on an ataxic syndrome affecting six patients who were also found to have hypothyroidism[(5)]. Hypothyroidism is one of the causes of acute onset ataxia. Stroke, viral encephalitis and drugs can also cause acute cerebellar ataxia. Mass lesions in the posterior fossa, infections such as HIV, and vitamin deficiencies like B1 and B12, alcohol and paraneoplastic syndromes are causes of sub acute onset cerebellar ataxia in an adult. Hypothyroidism has been recognized as a cause of gait ataxia [(4)].

Ataxia is the absence of voluntary muscle coordination and loss of control of movement that affects gait stability, eye movement, and speech [(6, 7)]. Ataxia has been linked to hypothyroidism, most likely as a result of cerebellar impairment, however the precise mechanism(s) by which this disease may be caused is still unknown[(8)]. Thyroid replacement medication has been shown to reverse ataxia in the majority of reported cases,[(8)] indicating that the metabolic and physiological effects of the hormone shortage were to blame for its development.[(9, 10)] The cerebellar condition, however, has persisted and advanced in some patients despite thyroid replacement medication.

Ataxia caused by hypothyroidism is frequently unrecognized. Study by Jellinek and Kelly on an ataxic syndrome affecting six patients who were also discovered to have hypothyroidism was published in 1960 [(11, 12)]. After hormone replacement, cerebellar symptoms improved in five of them. Jellinek and Kelly also brought up the possibility that people with ataxia may not exhibit the typical symptoms and signs of hypothyroidism. Information on hypothyroidism causing ataxia hasn't been widely published recently.

The first description of Hashimoto's encephalopathy (HE), an autoimmune encephalopathy linked to thyroid antibodies, was made by Brain et al. in 1966 [(13)]. According to current theories, HE is connected to the autoimmune response secondary to Hashimoto's thyroiditis, and the immune inflammatory response during the pathogenic process, may cause focal or diffuse brain damage in the brain, leading to clinical symptoms like unconsciousness or focal neurological loss, including cognitive impairment, tremor, altered consciousness, transient aphasia, seizures, myoclonus, gait disorder/ataxia, and others[(13)]. The main aim of this study is to determine the prevalence of cerebellar Ataxia in patients with hypothyroidism. This study will help the clinical practitioner to keep in mind that there is chance of ataxia in patients suffering from hypothyroidism. So the clinical practitioner should take care of the patients to avoid such complication. There is evidence that the ataxia has been reversed by thyroid replacement therapy.

Objective: To determine the prevalence of cerebellar Ataxia in patients with hypothyroidism.

MATERIALS AND METHODS

Study Design and setting: The Cross-sectional study was conducted in Shaheed Mohtarma Benazir Bhutto Medical University, Larkana.

Duration of the study: Duration of the study was 6 months (July 2022–Dec 2022).

Inclusion Criteria:

- Patients with inability to maintain balance, gait, extremity and eye movements.
- Patients with poor muscle coordination.
- Patients with a history of unsteadiness of gait for 2 weeks.
- Patients suffering from hypothyroidism.
- Patients of 30-70 years of age.
- Both genders.

Exclusion Criteria:

- Patients with Parkinson disorder.
- Patients with a history of alcoholism.
- Patients not willing to participate in study.

Methods: After the permission of Research evaluation unit (REU) of College of Physicians and Surgeons Pakistan (CPSP), a total of 13 patients were enrolled and written informed consent for the study was obtained from patients. Routine blood investigation and Thyroid Function Tests were done for all patients. MRI was done for all patients in order to diagnosed cerebellar ataxia. MRI brain was normal in our patients. All the data was collected in predesigned questioner.

Statistical Analysis: SPSS (version 25.0) was used for the analysis of data. The data was presented in the form of table and graph.

RESULTS

A total of 13 patients with mean age of 50.92±11.21 years were enrolled. Out of total, 69.2%patientswere male and 30.8% patients were female (Table 2-0, Fig 1-0). Clinical characteristics of enrolled patients are given in table 1-0. The mean and SD value of T3, T4 and TSH were 50.9±11.21, 2.80±0.63 and 77.30±10.57 respectively. The TPO antibodies test were performed that shows mean value of 31.15±3.38, that fall in normal range. Distribution of patients on the basis of Ataxia were done and it was found that 4 (30.8%) had ataxia disorder (Table 3-0, Fig 2-0).

Table 1: Clinical characteristics of enrolled patients (n=13)

Variable	Mean	SD
T3(ng/dL)	50.9	11.21
T4(ug/dL)	2.80	0.63
TSH (mU/L)	77.30	10.57
TPO antibodies (IU/ml)	31.15	3.38

Table2: Distribution of patients on the basis of gender with mean age (n=13)

Variables	Mean	SD
Age	50.92	11.21
Gender:	Frequency	Percentage
Male	9	69.2
Female	4	30.8
Total	13	100.0

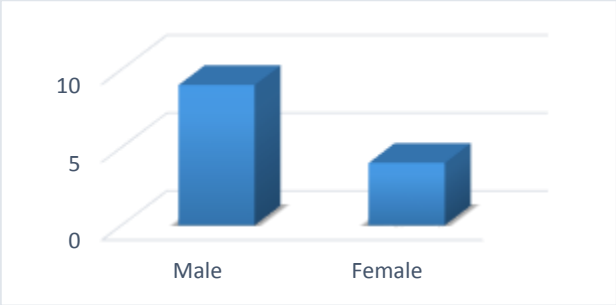

Figure 1: Graphical Representation of distribution of patients according to gender (n=13)

Table 3: distribution of patients on the basis of cerebellar ataxia (n=13)

Cerebellar ataxia	Yes	No
	4 (30.8%)	9 (69.2%)

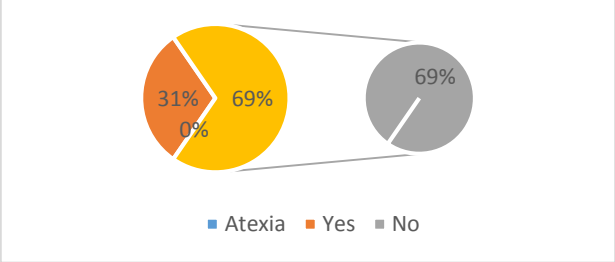

Figure 2: Graphical Representation of distribution of patients according to cerebellar ataxia (n=13)

Table 4: Stratification of Ataxia patients on the basis of gender (n=13)

Gender	Ataxia	
	Yes	No
Male	3 (33.3%)	6 (66.7%)
Female	1 (25.0%)	3 (75.0%)

DISCUSSION

One of the main causes of acutely developing ataxia is hypothyroidism. Acute cerebellar ataxia can also be brought on by medications, viral encephalitis, and stroke. Adults with sub-acute onset cerebellar ataxia may have mass lesions in the posterior fossa, infections like HIV, vitamin deficits including those in B1 and B12, alcohol use disorders, and paraneoplastic diseases[5, 11].

Some circumstances, such as nutrient shortages, intoxication, hypoxia, hyperthermia, paraneoplastic syndromes, and olivopontocerebellar degeneration of unknown source, are well recognised to induce progressive non-familial adult onset cerebellar degeneration (PNACD). Gait ataxia has been linked to hypothyroidism, most likely as a result of cerebellar impairment, though the precise mechanism(s) by which this disease might be caused is still unknown [14].

Cerebellar dysfunction in patients with thyroid disorders can be caused by two different mechanisms[8], each of which can be treated by thyroid replacement therapy: in patients with hypothyroidism not associated with auto-immunity, the endocrine disorder causes cerebellar dysfunction, which can be reversed by thyroid replacement; and in patients with autoimmune thyroiditis, auto-immune mediated cerebellar degeneration is a likely mechanism in patients who are not treated by thyroid replacement therapy. Since hypothyroidism is a treatable cause of ataxia, it should be taken into account in all cerebellar ataxia cases. The Holfman syndrome, pseudomyotonia, myxedema, Wottman's sign, entrapment neuropathies, Hashimoto's encephalopathy, and hearing loss are some of the other neurological symptoms of hypothyroidism [14].

Congenital hypothyroidism also has cerebellar impairment as a symptom. Up to 40% of kids and teenagers with congenital hypothyroidism have been shown to have minor cerebellar dysfunctional symptoms, such as intention tremor, tandem gait issues, awkward running, fine motor dysfunction, and unstable posture. Hypothyroidism impedes cerebellar development, according to animal studies [15]. It is yet unknown what causes cerebellar ataxia to occur in hypothyroid patients. The cerebellum hasn't been shown to undergo any normal morphological alterations. It's believed that a thyrogenic, particular metabolic component is to blame, aggravating already present, non-specific cerebellar alterations. The prognosis is excellent/ On the other hand, cerebellar ataxia resulting from congenital hypothyroidism has typical histological cerebellar changes and prognosis is very poor unless thyroxine treatment is started soon after birth [4].

There is little literature available on hypothyroidism causing ataxia. So the present study was conducted in order to evaluate the prevalence of cerebellar Ataxia in patients with hypothyroidism. In our study 30.8% of patients with hypothyroidism had cerebellar Ataxia. Selim and Drachmann [8]described six cases of cerebellar ataxia linked to auto-immune thyroiditis in which the cerebellar symptoms worsened despite the patient's thyroid functioning normally. This study is male dominant study. Out of total ataxia affected patients **33**.3% were male and 25.0 were female.

CONCLUSION

It was concluded that Hypothyroidism is one of the common cause cerebellar ataxia. So hypothyroidism affected patients have more chances of developing cerebellar ataxia. Therefore, this study recommends that Hypothyroidism should be treated at initial stages as it is partially or completely reversible cause of cerebellar ataxia.

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