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Effect of Hypothyroidism on Motor Nerve Conduction Studies

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ABSTRACT
Background:*The thyroid hormones are not essential for maintenance of vital functions of life, their deficiency causes severe deficit in mental and physical growth and extreme decrease in body metabolism. Although hypothyroidism affects almost all systems of the body, these patients often have symptoms and signs of neurological dysfunction. The motor neural dysfunction may be linked to the various functional and structural changes in peripheral nerves associated with deficiency of thyroid hormones.*
Objectives: *The aim of the study was to evaluate the effect of hypothyroidism on motor nerve conduction studies.*
Methods:*This is a cross sectional analytic study aimed to evaluate the nerve conduction study parameters among the recently diagnosed and untreated hypothyroid patients. The study was conducted in the Department of Neurology, Medicine, Endocrinology & Metabolism Sir Salimullah Medical College & Mitford Hospital, Dhaka among 30 newly diagnosed hypothyroidism patients and 30 healthy individuals who were not diagnosed for any thyroid disease. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-22), where required.*
Results:*The mean age of hypothyroid patients was 51.83±9.09 years, with a minimum age of 32 and a maximum age of 64 years. The average age of the controls was 48.33±5.77 years, with a minimum age of 38 and a maximum age of 59 years. Among hypothyroid patients, 18 (60.0%) were female and 12 (40.0%) were male, whereas among controls, 16 (53.3%) participants were female and 14 (46.7%) participants were male.*
Conclusion:*Development of neurological dysfunction is insidious in onset, which will take a long period of time for clinical manifestations, exploration of alteration in motor nerve conduction parameter can lead to identification of the patients with hypothyroidism who are prone to neurological manifestation and to take necessary measures. Early diagnosis and treatment of neuropathy due to hypothyroidism and can prevent long term neurological deficit.*
Keywords:*Thyroid hormones, Hypothyroidism, Neurological dysfunction, Motor nerve.*
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I. INTRODUCTION

The thyroid gland is one of the larger endocrine glands of the body. The gland has two primary functions. The first is to secrete the thyroid hormones, which maintain the level of metabolism in the tissues that is optimal for their normal function. The second function of the thyroid gland is to secrete calcitonin, a hormone that regulates circulating levels of calcium. [1] The principal hormones secreted by the thyroid are thyroxine (T4) and triiodothyronine (T3). Both these hormones maintain the level of metabolism in the tissues that is optimal for their normal function. They play an important role in normal tissue growth and maturation and also have multiple effects on the neuromuscular system and the brain. As a result, both hyperthyroidism and hypothyroidism may cause various neurological signs and symptoms. [2, 3]

Hypothyroidism is estimated to affect 3.8%–4.6% of general population. [4] In Hypothyroidism, as the thyroid hormone is not produced in enough amounts by thyroid gland, may be the cause of neuropathies. [2, 3] This may be caused by severe, long-term and untreated hypothyroidism. It has been found to be associated with the myopathy, mononeuropathy, and sensorimotor poly neuropathy, the condition of having multiple sensory, and motor neuropathies. [5]The reported prevalence of these signs and symptoms is variable. Few prospective studies on this topic have been performed. The prevalence of neuropathy in hypothyroid patients varied between 10% and 70% and that of myopathy between 20% and 80%. [3]In hypothyroidism, the muscle contraction and

relaxation are slowed down while duration is prolonged. Patients develop the usual manifestations of peripheral neuropathy, e.g., loss of reflexes, weakness of proximal muscle, paraesthesia, decrease sensations e. g., vibration, joint-position, and touch-pressure. [5]

The pathogenesis of neuropathy in hypothyroidism is multifactorial. The thyroid hormones stimulate the mitochondrial respiratory activity to produce energy in the form of ATP during aerobiosis under normal physiological conditions. Hypothyroidism leads to energy deficit due to decreased oxidation of nutrients. Decreased degradation of glycogen leads to formation of glycogen deposits around the nerves. These metabolic alterations induced by hypothyroidism may initially damage the functions and later on induce structural changes in the nerves. [6]

Nerve conduction study (NCS) is an electrodiagnostic technique to study functional status of the peripheral nerves and establish the type and degree of abnormalities of the nerves. It is now widely used, not only for the precise localization of neural lesions, but also for the accurate characterization of the peripheral nerve functions. The structural as well as functional changes in the nerves can be evaluated by these nerve conduction studies early and accurately in the course of the neural disease. [5]Previous study findings suggest that the polyneuropathy is associated with hypothyroidism. The findings reveal that there is subclinical peripheral nerve involvement in diagnosed cases of hypothyroidism. CV and F-minimum latency were significantly reduced in cases as compared to controls in bilateral median nerves and DML significantly reduced in cases as compared to controls in left median nerves. [7] Therefore, the present study aimed to evaluate the nerve conduction study parameters among the hypothyroid patients.

II. METHODOLOGY

This cross-sectional analytical study was carried out in the Department ofNeurology, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh, duringMarch, 2019 to September, 2020. A total of 60 patients were participated in the study. The population of this study consist of patients of hypothyroidism attending the Department of Neurology, Medicine, Endocrinology & Metabolism (Indoor & OPD) Sir Salimullah Medical College Mitford Hospital, Dhaka and the Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) at Shahbag, Dhaka, Bangladesh. Apparently healthy volunteers not having any known or diagnosed illness and thyroid profiles were within normal range with age& sex matched.After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24), where required.

III. RESULTS

Table I: Distribution of participants by age (n=60)

Age (Years)	Hypothyroid(n=30)	Controls(n=30)	Statistics
32-41	4 (13.3%)	5 (16.7%)	p=0.080
42-51	11 (36.7%)	17 (56.7%)	
≥52	15 (50.0%)	8 (26.7%)	
Mean ±SD	51.83 ±9.09	48.33 ±5.77	
Range	32-64	38-59	

Table I shows the distribution of age of the patients. The mean age of the patients with hypothyroidism was 51.83 ±9.09 years where minimum age was 32 and maximum age was 64 years. The mean age of controls was 48.33 ±5.77 years where minimum age was 38 and maximum age was 59 years. Independent Sample t test showed that there was no significant statistical difference between the groups regarding age (p=0.080).

Table II: Distribution of participants by sex (n=60)

Sex	Hypothyroid(n=30)	Controls(n=30)	Statistics
Female	18 (60.0)	16 (53.3)	p=0.602
Male	12 (40.0)	14 (46.7)	

Table II shows the distribution of the participants by sex. Among the hypothyroid patients, 18 (60.0%) patients were female and 12 (40.0%) patients were male while among the controls, 16 (53.3%) participants were female and 14 (46.7%) participants were male. Chi square test showed that there no was significant statistical difference between the groups regarding sex (p=0.602).

Table III: Distribution of participants by Body mass index (BMI) (n=60)

BMI (in kg/m^2)	Hypothyroid (n=30)	n=30	%
Normal	7	22	p=0.017
Overweight	23	8	
Mean ±SD	25.85 ±1.98	24.44 ±1.12	
Min-Max	23.9-29.1	22.7-26.1	

Table III shows the distribution of BMI of the patients. The mean Body mass index (BMI)of the patients with hypothyroidism was 25.85 ±1.98 kg/m^{2}whereas the mean BMI of controls was 24.44 ±1.12 kg/m^2. Independent Sample t test showed that there was significant statistical difference between the groups regarding BMI (p=0.017).

Table IV: Distribution of hypothyroid patients by muscle strength of upper limb (n=30)

Diagnosis	n=30	%
Muscle movement is possible against gravity	3	10.0
Muscle strength is reduced, but movement against resistance is possible	11	36.7
Normal strength	16	53.3
Total	30	100.0

Table IV shows the distribution of hypothyroid patients by muscle strength of upper limb. Among the hypothyroid patients, 16 (53.3%) had normal strength while in 11 (36.7%) patients, muscle strength is reduced, but movement against resistance is possible.

Table V: Distribution of hypothyroid patients by muscle strength of lower limb (n=30)

Diagnosis	n=30	%
Muscle movement is possible against gravity	2	6.7
Muscle strength is reduced, but movement against resistance is possible	13	43.3
Normal strength	15	50.0
Total	30	100.0

Table V shows the distribution of hypothyroid patients by muscle strength of lower limb. Among the hypothyroid patients, 15 (50.0%) had normal strength while in 13 (43.3%) patients, muscle strength is reduced, but movement against resistance is possible.

Figure I: Distribution of hypothyroid patients by deep tendon reflex grading (n=30)

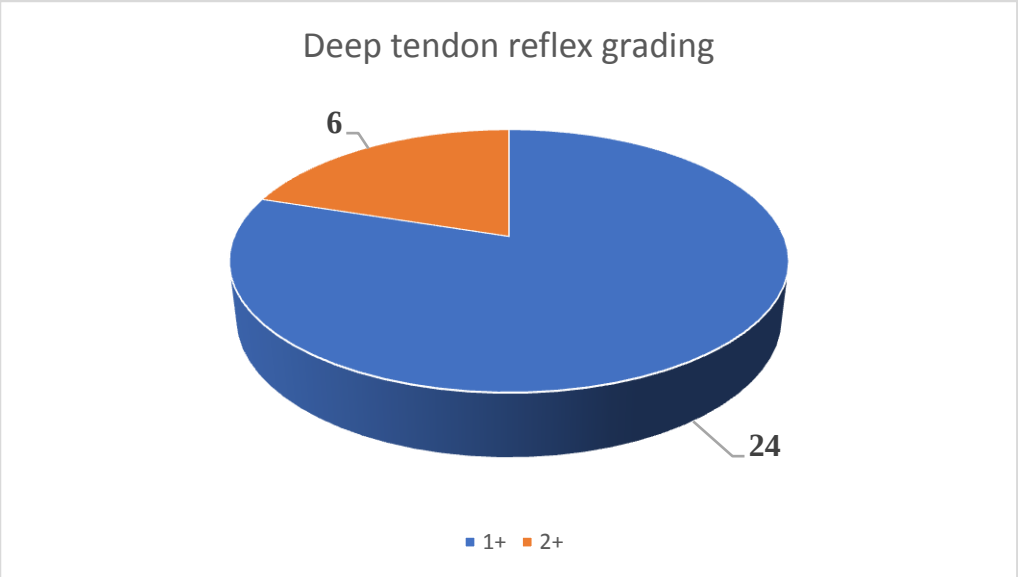

Figure I show the distribution of hypothyroid patients by deep tendon reflex grading. Among the hypothyroid patients, 24 (80.0%) had a slight but definitely present response; may or may not be normal (1+) while in 6 (20.0%) patients had a brisk response; normal (2+).

Table VI: Distribution of hypothyroid patients by Phalen's sign and Tinel's sign (n=30)

Characteristics	n=30	%
Phalen's sign		
Negative	16	53.3
Positive	14	46.7
Total	**30**	**100.0**
Tinel's sign		
Negative	16	53.3
Positive	14	46.7
Total	**30**	**100.0**

Table VI shows the distribution of hypothyroid patients by Phalen's sign and Tinel's sign. Among the hypothyroid patients, Phalen's sign and Tinel's sign were negative in 16 (53.3%) patients.

Table VII: Comparison of Conduction velocity between patients with normal and impaired muscle strength of hypothyroid patients (n=30)

Conduction velocity	Normal	Impaired	P-value
Upper right			
Up to 49	2 (12.5%)	10 (71.4%)	0.002
>49	14 (87.5%)	4 (28.6%)	
Upper left			
Up to 49	0 (0.0%)	2 (14.3%)	0.207
>49	16 (100.0%)	12 (85.7%)	
Lower right			
Up to 41	0 (0.0%)	7 (46.7%)	0.006
>41	15 (100.0%)	8 (53.3%)	
Lower left			
Up to 41	1 (6.7%)	7 (46.7%)	0.035
>41	14 (93.3%)	8 (53.3%)	

Table VII shows that in upper right limb, among the patients with normal muscle strength, 14 (87.5%) had conduction velocity >49 while among the patients with impaired muscle strength, 4 (28.6%) had conduction velocity >49 (p=0.002). Again, in lower right limb, among the patients with normal muscle strength, 15 (100.0%) had conduction velocity up to 41 while among the patients with impaired muscle strength, 8 (53.3%) had conduction velocity up to 41 (p=0.006). In left side of lower limb, 1 (6.7%) had conduction velocity up to 41 while among the patients with impaired muscle strength, 7 (46.7%) had conduction velocity up to 41 (p=0.006).

Table VIII: Comparison of distal latency between patients with normal and impaired muscle strength of hypothyroid patients (n=30)

Distal latency	Normal	Impaired	p value
Upper right			
Up to 6	16 (100.0%)	2 (14.3%)	<0.001
>6	0 (0.0%)	12 (85.7%)	
Upper left			
Up to 6	16 (100.0%)	12 (85.7%)	0.209
>6	0 (0.0%)	2 (14.3%)	
Lower right			
Up to 6	15 (100.0%)	9 (60.0%)	0.017
>6	0 (0.0%)	6 (40.0%)	
Lower left			
Up to 6	12 (80.0%)	8 (53.3%)	0.121
>6	3 (20.0%)	7 (46.7%)	

Table VIII shows that in upper right limb, among the patients with normal muscle strength, all (100.0%) patients had distal latency up to 6 while among the patients with impaired muscle strength, 2 (14.3%) had distal latency

up to 6 (p<0.001). Again, in lower right limb, among the patients with normal muscle strength, 15 (100.0%) had distal latency up to 6 while among the patients with impaired muscle strength, 9 (60.0%) had distal latency up to 6 (p=0.017). No significant difference was observed between the groups in upper left and lower left regarding distal latency as p>0.05.

Table IX: Distribution of hypothyroid patients by diagnosis according to nerve conduction study (n=30)

Diagnosis	n=30	%
Demyelination		
Conduction velocity <49 m/sec in upper limb	10	33.3
Conduction velocity<41 m/sec in lower limb	8	26.7
Distal latency >6 m.sec in upper limb	28	93.3
Distal latency>6 m.sec in lower limb	24	80.0
Axonopathy		
Amplitude<4.4 volt in upper limb	1	3.3
Amplitude<3.0 volt in lower limb	0	0.0

Table IX shows the distribution of hypothyroid patients by diagnosis according to nerve conduction study. Among the hypothyroid patients, 29 (96.7%) had demyelination where 10 (33.3%) had conduction velocity <49 m/sec in upper limb. Distal latency >6 m.sec in upper limb was found in 28 (93.3%) patients and Distal latency>6 m.sec in lower limb was found in 24 (80.0%) patients. Axonopathy was found in 1 (3.3%) patient.

Figure II: Distribution of hypothyroid patients by Thyroid-Stimulating Hormone (TSH) (n=30)

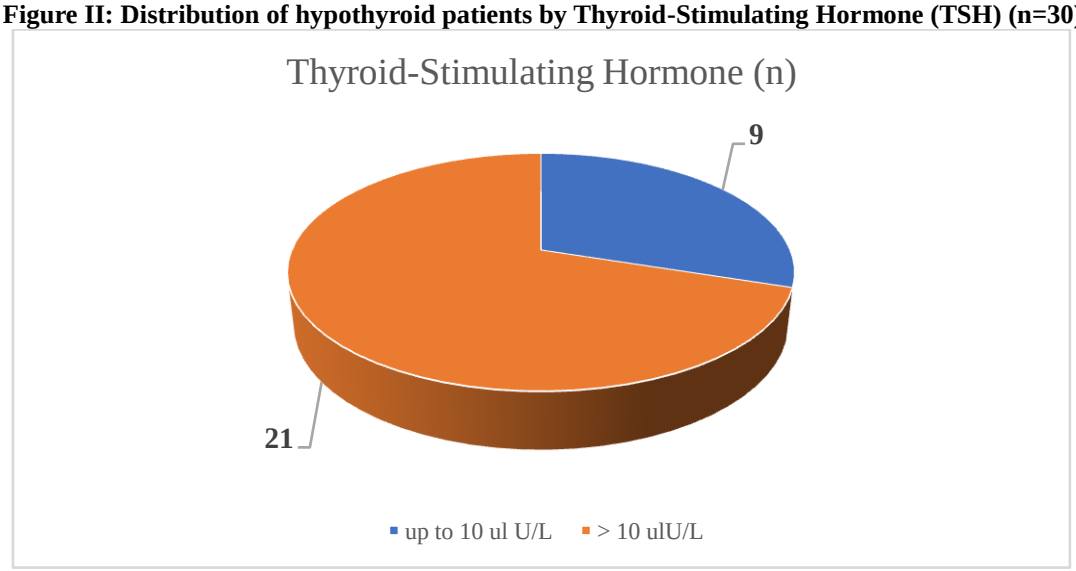

Figure II shows the distribution of hypothyroid patients by Thyroid-Stimulating Hormone (TSH). Among the hypothyroid patients, 21 (70.0%) had TSH level > 10ulU/L where 9 (30.0%) had TSH level up to 10ulU/L.

Table X: Distribution of Thyroid hormone levels (n=60)

Thyroid hormone levels	Hypothyroid (n=30)	Controls (n=30)	Statistics
T3 (in pmol/L)	1.33 ±0.42	4.05 ±1.20	p<0.001
T4 (in pmol/L)	8.36 ±1.75	11.94 ±3.52	p<0.001

Independent Sample t test

Table X shows the distribution of Thyroid hormone levels of the patients. The mean T3 and T4 of the patients with hypothyroidism were 1.33 ±0.42 pmol/L and 8.36 ±1.75 pmol/L respectively which was significantly lower than healthy controls (p<0.001).

Table XI: Distribution of nerve conduction parameters in upper limb (n=60)

Nerve conduction parameters	Hypothyroid (n=30)	Controls (n=30)	Statistics

Right side			
Conduction velocity (m/sec)	50.06 ±5.81	54.93 ±3.29	p<0.001
Distal latency (m.sec)	5.15 ±2.56	2.67 ±0.69	p<0.001
Amplitude (in volt)	11.28 ±4.00	13.14 ±3.12	p=0.049
Left side			
Conduction velocity (m/sec)	53.11 ±4.38	55.22 ±2.44	p=0.026
Distal latency (m.sec)	3.86 ±1.75	2.96 ±0.50	p=0.002
Amplitude (in volt)	10.25 ±2.84	13.55 ±2.56	p<0.001

Independent Sample t test

Table XI shows the distribution of nerve conduction parameters in upper limb. In right limb, the Conduction velocity was significantly lower in patients with hypothyroidism (p<0.001) while the Distal latency was significantly higher in patients with hypothyroidism (p<0.001). The Amplitude was significantly lower in patients with hypothyroidism (p=0.049). In left limb, the Conduction velocity was significantly lower in patients with hypothyroidism (p=0.026) while the Distal latency was significantly higher in patients with hypothyroidism (p=0.002). Highly significant statistical difference was observed between the groups regarding Amplitude (p<0.001).

Table XII: Distribution of nerve conduction parameters in lower limb (n=60)

Nerve conduction parameters	Hypothyroid(n=30)	Controls(n=30)	Statistics
Right side			
Conduction velocity (m/sec)	43.09 ±8.09	45.85 ±2.73	p=0.087
Distal latency (m.sec)	5.59 ±2.07	3.58 ±0.57	p<0.001
Amplitude (in volt)	9.33 ±6.81	9.93 ±1.92	p=0.647
Left side			
Conduction velocity (m/sec)	43.74 ±8.17	45.38 ±1.66	p=0.290
Distal latency (m.sec)	5.94 ±1.74	3.46 ±0.44	p<0.001
Amplitude (in volt)	8.11 ±5.67	10.29 ±2.70	p=0.064

Independent Sample t test

Table XII shows the distribution of nerve conduction parameters in lower limb. In right limb, no significant statistical difference was observed between the groups regarding the Conduction velocity as p=0.087 while the Distal latency was significantly higher in patients with hypothyroidism (p<0.001). No significant statistical difference was observed between the groups regarding Amplitude (p=0.647). In left limb, no significant statistical difference was observed between the groups regarding the Conduction velocity as p=0.290 while the Distal latency was significantly higher in patients with hypothyroidism (p<0.001). No significant statistical difference was observed between the groups regarding Amplitude (p=0.067).

Table XIII: Comparison between hypothyroid patients with up to 10 ulU/L and> 10ulU/L TSH level regarding nerve conduction parameters in upper limb (n=30)

Nerve conduction parameters	Group	Mean rank	Sum of ranks	Z	p value
Conduction velocity (Right)	Up to 10	19.83	178.50	-1.769	0.077
	> 10	13.64	286.50		
Conduction velocity (left)	Up to 10	18.11	163.00	-1.066	0.287
	> 10	14.38	302.00		
Distal latency (right)	Up to 10	15.06	135.50	-.182	0.856
	> 10	15.69	329.50		
Distal latency (left)	Up to 10	14.89	134.00	-.251	0.802
	> 10	15.76	331.00		
Amplitude (right)	Up to 10	16.72	150.50	-0.499	0.618
	> 10	14.98	314.50		
Amplitude (left)	Up to 10	17.28	155.50	-0.725	0.468

	> 10	14.74	309.50		

Mann Whitney U test

Table XIII shows the comparison between hypothyroid patients with up to 10 ulU/L and> 10ulU/L TSH level regarding nerve conduction parameters in upper limb. No significant statistical difference was observed between the groups regarding nerve conduction parameters in upper limb (p>0.05).

Table XIV: Comparison between hypothyroid patients with up to 10 ulU/L and> 10ulU/L TSH level regarding motornerve conduction parameters in lower limb (n=30)

Nerve conduction parameters	Group	Mean rank	Sum of ranks	Z	p value
Conduction velocity (Right)	Up to 10	17.94	161.50	-.998	0.319
	> 10	14.45	303.50		
Conduction velocity (left)	Up to 10	21.50	193.50	-2.447	0.014
	> 10	12.93	271.50		
Distal latency (right)	Up to 10	12.06	108.50	-1.407	0.159
	> 10	16.98	356.50		
Distal latency (left)	Up to 10	9.83	88.50	-2.313	0.021
	> 10	17.93	376.50		
Amplitude (right)	Up to 10	16.83	151.50	-0.544	0.586
	> 10	14.93	313.50		
Amplitude (left)	Up to 10	19.17	172.50	-1.497	0.134
	> 10	13.93	292.50		

Mann Whitney U test

Table XIV shows the comparison between hypothyroid patients with up to 10 ulU/L and> 10ulU/L TSH level regarding nerve conduction parameters in lower limb. The mean rank of conduction velocity (left) was significantly higher among patients with up to 10ulU/L TSH compared to patients with >10ulU/L TSH. Again, the mean rank of distal latency (left)was significantly lower among patients with up to 10ulU/L TSH compared to patients with >10ulU/L TSH.

Table XV: Correlation between TSH and motor nerve conduction parameters in upper limb (n=30)

Variable	r_s	p value
Conduction velocity (right)	-.040	0.834
Conduction velocity (left)	-.065	0.734
Distal latency (right)	0.063	0.739
Distal latency (left)	0.095	0.616
Amplitude (right)	-0.054	0.775
Amplitude (left)	0.076	0.689

Table XV shows the correlation between TSH and motornerve conduction parameters in upper limb. No significant statistical difference was observed between the groups regarding nerve conduction parameters in upper limb (p>0.05).

Table XVI: Correlation between TSH and motor nerve conduction parameters in lower limb (n=30)

Variable	r_s	p value
Conduction velocity (right)	-0.155	0.412
Conduction velocity (left)	-0.347	0.060
Distal latency (right)	0.519	0.003
Distal latency (left)	0.494	0.006
Amplitude (right)	0.025	0.896
Amplitude (left)	-0.096	0.614

Table XVI shows the correlation between TSH and motornerve conduction parameters in lower limb. Moderate positive correlation (r_s=0.519) was present between distal latency (right)andTSH leveland this relation was statistically significant (p=0.003). Again, moderate positive correlation (r=0.494) was present between distal latency (left)andTSH leveland this relation was statistically significant (p=0.006).

IV.
V. DISCUSSION

The mean age of the patients with hypothyroidism was 51.83 ±9.09 years where minimum age was 32 and maximum age was 64 years. The mean age of these patients was higher compared to other studies which were conducted among newly diagnosed hypothyroidism. [8, 2]This might be due to the delayed seeking of medical advice by our patients. Among the hypothyroid patients, majority of the patients were female. This was consistent with other studies which also had higher proportion of female patients compared to male. [9, 7]The present study found that the hypothyroid patients had statistically significant increased BMI as compared to that of healthy individuals. These findings related to BMI is consistent with that of other studies. [9, 5]In present study bothsides of upper limb, the conduction velocity and amplitude were significantly lower in patients with hypothyroidism while the distal latency was significantly higher in patients with hypothyroidism. Similar findings were observed in the studies of Mahadule et al. (2015) and Garg et al. (2015). However, Taksande et al. (2017) found conduction velocity and Amplitude were significantly lower in patients with hypothyroidism while no significant difference was found in case of the Distal latency. [7]

Again, conduction velocity was significantly lower in patients with hypothyroidism while the distal latency was significantly higher in patients with hypothyroidism while no significant difference was found in case of the amplitude. [10]In lower limb, no significant statistical difference was observed between the groups regarding the conduction velocity and amplitude while the distal latency was significantly higher in patients with hypothyroidism. Higher distal latency in lower limb was also reported in other studies. [2, 5] However, Mahadule and Garg observed significantly prolonged distal motor latencies, reduced amplitudes and slowed conduction velocity in the peripheral nerves in hypothyroid. [2, 5]

There is no exact explanation for asymmetric presentation of NCS parameters. The mechanisms have been studied extensively in some study. The metabolic alteration caused by hormonal imbalance affects the Schwann cell, inducing a segmental demyelination. Primary axonal degeneration has also been shown electrophysiologically and pathologically. [8] The mechanisms involved in the development of neuropathy in hypothyroidism are not yet fully established in present study. The neurological dysfunction associated with hypothyroidism may be a result of hormonal imbalance or may be related to the immune mechanisms associated with thyroid diseases shows other study. [8]Some investigators suggested that the weight gain in the hypothyroid individuals may be a contributory factor of neuropathy. Some study shows mucopolysaccharides in the tissue space led to compression over the peripheral nerves there by resulting in swelling and degeneration of the nerves. [11, 12] Study shows altered Motor conduction parameters are more pronounced for upper limb than for lower. Consistent with finding of other Study. The abnormal median nerve electro-diagnostic findings suggestive of Carpal tunnel syndrome (CTS) due to median nerve compression at wrist was observed in twenty-seven patients (67.5%), out of which twenty-six (97%) were symptomatic while only one patient presented asymptomatically (3%). [5] Study shows motor conduction parameter altered in the form compression neuropathy where Phalen's sign and Tinel's sign positive in 14 (46.7%) among the hypothyroid patients, and were negative in 16 (53.3%) patients. Though mechanism not established in this study. In other Study Carpal Tunnel Syndrome (CTS), was statistically higher in overt hypothyroidism group than control group. CTS was also observed higher in subclinical hypothyroidism group when compared with control group but it didn't reach to statistical significance.). [13]The median nerve entrapment at the wrist caused by the deposition of mucinous material in the tissues surrounding the nerve is one of the most frequent causes of peripheral nerve damage in hypothyroidism. [14]

Study shows motor nerve conduction parameters are altered more pronounced for upper limb than for lower. Others studies supported that there is a narrow gap in the carpal tunnel which leads to blood vessel stenosis, pressure in the wrist area and unnecessary use of the wrist causing early involvement of median nerve. [15] Present study shows hypothyroid with normal muscle strength 125% have reduced CV in upper limb while 20% have prolonged distal motor latencies in lower limb. Other study also suggests that. [8] The metabolic alteration caused by hormonal imbalance affects the Schwann cell, inducing a segmental demyelination. Primary axonal degeneration has also been shown electro physiologically and pathologically. [16]The present study found no significant correlation of TSH level with NCS parameters. Even when TSH was categorized into two groups (up to 10 ulU/L and > 10 ulU/L), no significant statistical difference was observed between the groups regarding nerve conduction parameters.Akarsu, et al. (2013) reported that even in subclinical hypothyroidism an increase in neuromuscular symptoms was observed. [13] Das, et al. (2017) also found that TSH did not show any significant correlation with NCS parameters. [17] They concluded that impairments of peripheral neuronal activity start even at the sub clinical stage of hypothyroidism. Level of TSH gets elevated as a compensatory mechanism in hypothyroidism which on the other hand helps to normalize thyroid hormone level. Therefore, elevated TSH level in hypothyroidism is not actually a mark of severity of the disease unless it is associated with grossly reduced level of thyroid hormones as well. [18]

Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

VI. CONCLUSION

Neurological changes occur in some of the cases of hypothyroidism before their first attendance to the physician.Motor conduction parameters are altered in patients with hypothyroidism such as, prolonged distal motor latencies, reduced amplitudes, slowed conduction velocity. Motor conduction parameters alteration more pronounced for upper limb than for lower.No significant correlation is found between TSH level and motor conduction parameters.

VII. RECOMMENDATION

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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The wide range of disciplines involved in effect of hypothyroidism on Motor nerve conduction studies research means that editors need much assistance from referees in the evaluation of papers submitted for publication. I would also like to be grateful to many colleagues for their thorough, helpful and usually prompt responses to requests for their advice and family who supported me and offered deep insight into the study.

DECLARATION

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Conflict of interest: None declared.

Ethical approval: The study was approved by the ethical committee of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh.

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