Subclinical Peripheral Nerve Affection in Hypothyroidism

Thesis

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By

Mai Abdel Azeem Abdel Azeem Rabie
M.B., B.CH.
Faculty of Medicine – Cairo University

Under Supervision of

Prof. Dr. Mohammed Ragaai Said El-helow
Professor of Physical Medicine, Rheumatology and Rehabilitation
Faculty of Medicine – Ain Shams University

Prof. Dr. Mona Gamal Eldin Elhussieny
Professor of Physical Medicine, Rheumatology and Rehabilitation
Faculty of Medicine – Ain Shams University

Ass. Prof. Dr. Abeer Ahmed Kadry El Zohiery
Assistant Professor of Physical Medicine, Rheumatology and Rehabilitation
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams Univeristy
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Mai Abdel Azeem Abdel Azeem Rabie

Dedication

To:

My parents

for their endless love, support,

and continuous care

My Husband

&

My Family

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List of Abbreviations

Abb.	Full term
AN	*Autonomic Neuropathy*
ANA	*Antinuclear Antibodies*
ABP	*Arterial Blood Pressure*
AP	*Action Potential*
ATP	*Adenosine Triphosphate*
BCAT	*Branched Chain Aminotransferase*
BMI	*Body Mass Index*
C-ANCA	*Cytoplasmic Antineutrophil Cytoplasmic Antibodies*
CBC	*Complete Blood Count*
CMAP	*Compound Muscle Action Potentional*
CNS	*Centeral Nervous System*
CSF	*Cerebrospinal Fluid*
CT	*Computed Tomography Scan*
CTS	*Carpal Tunnel Syndrome*
CV	*Conduction Velocity*
DL	*Distal Latancy*
DM	*: Diabetes Mellitus*
DML	*Distal Motor Latancy*
DSL	*Distal Sensory Latancy*
EDx	*Electrodiagnostic*
EMG	*Electromyography*
FBS	*Fasting Blood Sugar*
GABA	*Gamma-Aminobutyric Acid*
GAD	*Glutamate Decarboxylase*
HBV	*Hepatitis B Virus*
HCV	*Hepatitis C Virus*
HIV	*Human Immunodeficiency Virus*
HMGCR	*3-Hydroxy-3-Methyl-Glutaryl Coenzyme A Reductase*
Hz	*Hertz*
IFT	*Interferentional Therapy*

List of Abbreviations cont...

Abb.	Full term
LDL	*Low Denisty Lipoprotein*
LLLT	*Low Level Laser Therapy*
mA	*Milliampere*
mcg/dl	*Micrograms per Deciliter.*
mcg/kg	*Microgram / Kilogram*
mIU/L	*Milli-International Units Per Litre*
nmol/L	*Nan Moles per Liter*
MI	*Myocardial Infarction*
MRI	*Magnetic Resonance Imaging*
NCS	*Nerve Conduction Study*
NMJ	*Neuromascular Junction*
P-ANCA	*Perinuclear Antineutrophil Cytoplasmic Antibodies*
PNS	*Peripheral Nervous System*
PN	*Peripheral Neuropathy*
PPBS	*Post Prandial Blood Sugar*
RA	*Rheumatoid Arthritis*
RRR	*Rapid Plasma Regain*
SD	*Standard Deviation*
SLE	*Systemic Lupus Erythromatosus*
SNAP	*Sensory Nerve Action Potential*
SPEP	*Serum Protein Electrophoresis*
SPSS	*Statistical Package for Social Sciences*
T3	*Triiodothyronine*
T4	*Thyroxine*
TBH	*Thyroxin-Binding Globulin*
TENS	*Transcutaneous Electrical Nerve Stimulation*
TPO	*Thyroperoxidase*
TRH	*Thyrotropin Releasing Hormone*
TSH	*Thyroid Stimulating Hormone*
TTS	*Tarsal Tunnel Syndrome*
US	*Ultrasound*

INTRODUCTION

Thyroid hormones are involved in many processes and functions of the nervous system. They affect the central and peripheral nervous systems via their role in gene expression, production of myelin, and their effects on the neurotransmitter system and axonal transportation ***(Waghmare et al., 2015).***

Hypothyroidism is a common medical condition in the general population caused by decreased hormone production leading to common systemic manifestations including fatigue, constipation, cold intolerance, weight gain, hair loss, dry skin, irregular menstrual periods and hoarseness ***(Tintinalli, 2011).***

Also, a variety of central and peripheral nervous system manifestations are common in patients with hypothyroidism like myxedema coma, cognitive impairment, cerebellar ataxia, carpal tunnel syndrome, tarsal tunnel syndrome, peripheral neuropathy, and myopathy ***(Shiri, 2014 and Kim et al., 2009).***

Diagnosis of hypothyroidism is based on laboratory testing:

Elevated serum thyroid stimulating hormone (**TSH**) with or without low serum free thyroxine **(FT4**) concentration, with or without low serum free Triiodothyronine (**FT3**) concentration ***(Dayan, 2001).***

In pituitary or hypothalamic hypothyroidism, there is discordance between the expected concentrations of TSH&

Free T4. The patient has a low or low normal T4 and a TSH is normal, low or minimally elevated, a serum thyrotropin releasing hormone (TRH) should be done to measure pituitary secretory reserve ***(Brent et al., 1986).***

Subclinical hypothyroidism is defined biochemically as a normal serum free T4 and free T3 concentration in the presence of an elevated serum TSH concentration ***(Biondi and Cooper, 2008).***

The treatment of choice for correction of hypothyroidism and its subsequent manifestations is levothyroxine according to the American thyroid association guidelines for the treatment of hypothyroidism ***(Jonklaas et al., 2014).***

Peripheral neuropathy describes damage to the peripheral nervous system, which may affect sensation, movement, gland or organ function, and other aspects of health, depending on the type of nerve affected.

Peripheral neuropathy may be either inherited or acquired. Causes of acquired peripheral neuropathy include systemic diseases (the commonest cause), trauma from external agents, and infections or autoimmune disorders affecting nerve tissue. Neuropathy affecting just one nerve is called "mononeuropathy" and neuropathy involving multiple nerves in roughly the same areas on both sides of the body is called "symmetrical polyneuropathy" or simply "polyneuropathy."

When two or more (typically just a few, but sometimes many) separate nerves in disparate areas of the body are affected it is called "mononeuritis multiplex" ***(Janet et al., 2010).***

The pathogenesis of the hypothyroid neuropathy is incompletely understood, with variable pathologic descriptions including mucopolysaccharide-protein complexes within the endoneurium and perineurium, reduction in the number of large myelinated fibers with segmental demyelination and remyelination, aggregates of glycogen granules, mitochondria, lipid droplets, and lamellar bodies and axonal degeneration with shrinkage of axons, and disruption of neurotubules and neurofilaments ***(Waghmare et al., 2015).***

Nerve conduction studies (**NCS**) which include motor and sensory nerve conduction together with F wave study can play an important role in diagnosis of peripheral neuropathy because electrophysiological signs of neuropathy are detectable even sub clinically ***(Gilchrist and Sachs, 2004).***