## Carpal tunnel syndrome in Patients with Parkinson's disease

A thesis submitted For partial fulfillment of master degree In Physical medicine, Rheumatology and rehabilitation

Ву

#### Shaimaa Mohamed RaafatShahin MBBch Alex, university

#### Supervisors

Prof. Dr. Hanan El-Sebaie El-Hefnawy
Prof. of Physical medicine, Rheumatology and rehabilitation
AinShamsUniversity

Prof.Dr. Hebatallah Ahmed El -Shamy
Prof. of Physical medicine, Rheumatology and rehabilitation
AinShamsUniversity

Prof. Dr. HebaFawzy El-Shishtawy
Prof. of Physical medicine, Rheumatology and rehabilitation
AinShamsUniversity

بسر الله الرحين الرحير

الله الرحين الرحير الذي كنا إله ما علمتنا انتف أنت الله العليم الكفيم ))

العليم الكفيم )

سورة البقرة

## Acknowledgemens

First and foremost, thanks to **GOD**, the most beneficent and most gracious, the most merciful, for blessing this work until it has reached its end, as a part of his generous gifts throughout my life.

I wish to express my sincere thanks and deepest gratitude to, **Prof.Dr. Hanan El-Sebaie El-Hefnawy**, Professor of Physical Medicine and Rehabilitation, Faculty of Medicine, Ain Shams University, for his kind supervision, constructive guidance, criticism and his support throughout this work.

I am greatly honored to express my gratitude to **Prof. Dr.Heba-Allah Ahmed El-Shamy**, Professor of Physical Medicine Rheumatology and Rehabilitation, Faculty of Medicine, Ain Shams University, for her precious advices, valuable observations, and encouragement throughout the whole work.

I am greatly obliged to **Prof. Dr. HebaFawzy EL-Shishtawy**, Professor of Physical Medicine and Rehabilitation, Faculty of Medicine, Ain Shams University, for her close supervision, continuous help and effort during preparation and revision of this work. She devoted much of her time and experience

#### Acknowledgement

in the supervision of this work till it has seen the light.

I am also greatly indebted to **Dr. Hossam Saker,** Assisstant Lecturer, diagnostic radiology Faculty of Medicine, Ain Shams University, for his effort, guidance and support throughout this work.

Shaimaa Shahin

#### **Dedication**

## pedication

**To** my **Husband** for his support, advice and understanding.

**To** my **Family** for supporting me and pushing me forward all the time.

To the sweet of my life Adham, Sama and Kinzy.

Thank you all

Shaimaa

# List of contents List of Contents

Title	Page No.
List of Abbreviations	I
List of Figures	V
List of Tables	VIII
Introduction	1
Aim of the work	4
Review of Literature	
* Parkinson's disease	5
* Carpal tunnel syndrome	60
* Carpal tunnel syndrome in Pa disease	
Patients and Methods	137
Results	151
Discussion	183
Summary and conclusion	196

List of contents	
Recommendations	200
References	201
Arabic Summary	

## List of Abbreviations

ADC	Apparent diffusion coefficient.
ADQ	Abductor digiti qunti.
AIDS	Acquired immunodeficiency
	syndrome.
AP	Antroposterior.
BMT	Bone marrow transplantation.
CMAP	Compound motor action potential.
CNS	Central nervous system.
COMT	Catechol-O-methyltransferase.
CPK	Creatine phosphokinase.
CSA	Cross sectional area.
CSA-I	Cross sectional area of carpal tunnel
	inlet.
CT	Computed tomography.
CTS	Carpal tunnel syndrome
D	Dopamine receptor.
Das	Dopamine agonists.
DBS	Deep brain stimulation.
DML	Distal motor latency.
DRT	Dopamine replacement therapy.
DTI- MRI	Diffusion tensor magnetic resonance
	image.
DWI-MRI	Diffusion-weighted magnetic
	resonance image.
ED	vonEconomo's disease.
EDS	Excessive daytime somnolence.

EMG	Electromyography.
ET	Essential tremor.
GABS	Gait and Balance Scale.
GBA	Glucocerebrosidase.
GP	Globus pallidus.
GPe	Globus pallidus exeternal.
GPi	Globus pallidus internal.
GSH	Glutathione.
HAKs	4-hydroxy-2,3-alkenals.
HIV	Human immunodeficiency virus.
HNE	4-hydroxy-2,3- nonenal.
H&Y	Hoehn and Yahr classification.
ICDs	Impulse control disorders.
IL	Interleukin.
L-dopa	Levo-dopa
LRRK2	The most prevalent causative genes
	inPD.
LSVT	Lee Silverman Voice Treatment.
MAO	Monoamine oxidase.
MAOB-I	Monoamine oxidase B inhibitor.
Max.	Maximum.
MDA	Malondialdehyde.
Min.	Minimum.
MPTP	1-Methyl-4-phenyl-1,2,3,6-
	tetrahydropyridine.
MRC	Motor response complications.
MSA	Multiple system atrophy.
N	Number.

NCS	Nerve conductivity study.
NMs	Nonmotor symptoms.
NMS	Neuroleptic malignant syndrome.
NSAIDs	Nonsteroidal anti-inflammatories.
PARK	Parkinsonism gene was named in a
	multi-generation Italian-American
	family.
P	Level of significance.
PD	Parkinson's disease.
PDQ-39	Parkinson disease questionnaire-39.
PDQUALIF	Parkinson's Disease Quality of Life
	Scale.
PDQL	Parkinson disease quality-of-life
	questionnaire.
PEP	Postencephalitic Parkinsonism.
PET	Positron emission tomography.
PG	Prostaglandin.
PML	Proximal motor latency.
PSP	Progressive supranuclear palsy.
ROI	Reactive oxygen intermediates.
SAs	Sleep attacks.
SCOPA	Scale for Outcomes in Parkinson's
	Disease.
<u>+</u> SD	Standerd deviation
SN	Substantia nigra.
SNAP	Sensory nerve action potential.

SPECT	Single photon emission computed
	tomography.
SPES	Parkinson's Evaluation Scale.
STN	Subthalamic nucleus.
T	Student's "t" test
TCL	Transverse carpal ligament.
UPDRS	Unified Parkinson's Disease Rating
	Scale.
US	Ultrasonography
X	Mean.
$\mathbf{x}^2$	Chi-Square test.

#### List of Tables

## List of Tables

Table no.	Title	Page no.
1	Etiologies For Acute Parkinsonism.	12-13
2	Classification of infectious causes of Parkinsonism.	13
3	Initial symptomatic therapy for Parkinson's disease.	59
4	Neurophysiological tests for the diagnosis of CTS.	117
5	Protocol proposed for the neurophysiological diagnosis of CTS.	118
6	Diagnostic criteria for CTS.	119&143
7	Comparison between patients & controls regarding age (year).	151
8	Comparison between patients & controls regarding Sex.	152
9	Clinical data of Parkinson's patients.	156
10	Patients data regarding median nerve electrophysiological studies.	158
11	Controls data regarding median nerve electrophysiological studies.	159
12	Comparison between patients and controls regarding median nerve electrophysiological studies.	160-161
13	Comparison between patients with and without CTS regarding nerve median electrophysiological studies.	161-162

#### List of Tables

14	Patients data regarding U/S findings.	165
15	Controls data regarding U/S findings.	166
16	Comparison between the patients & controls regarding U/S findings.	167
17	Comparison between patients with and without CTS regarding age and disease duration.	169
18	Comparison between patients with and without CTS regarding grades of Parkinson disease.	169-170
19	Correlation between age in relation to different variables.	170-171
20	Correlation between disease duration in relation to different variables.	172
21	Sensitivity, specificity, positive and negative predictive value of U/S and nerve conduction.	175

#### List of Figures

## **Ust of Figures**

Fig. no.	Title	Page no.
1	Basal ganglia circuitry.	28
2	Dopamine receptor subtypes.	31
3	DaT scan of the brain in Parkinson's disease.	42
4	PET scans of the brain in Parkinson's disease.	43
5	Transcranial ultrasonography in early Parkinson's disease.	44
6	The anterior (palmar) anatomy of the carpal tunnel.	65
7	The transverse anatomy of the carpal tunnel, through the level of the distal carpal row.	66
8	Common variations of the path of the recurrent branch of the median nerve in relationship to the flexor retinaculum.	69
9	Tinel's sign is performed applying repeated digital percussion over the median nerve in a proximodistal direction.	104
10	Phalen's test is a provocation test done through maximal wrist flexion maintained for approximately 60 s.	104
11	The compression test, as described byDurkan.	105
12	Abnormal two-point discrimination is evaluated using the Weber's test.	105
13	Von Frey's pressure test is performed using theSemmes-Weinstein monofilament set.	106

#### List of Figures

14	MR T1-weighted axial scan. Normal anatomy. The carpal tunnel.	124
15	MR T1-weighted axial scan. Carpal tunnel syndrome.	124
16	MR T2-weighted sagittal scan. Carpal tunnel syndrome.	125
17	Ultrasound axial scan. In patient with CTS. There's thickening and bowing of the transverse ligament.	126
18	Ultrasound axial scan. In patient with persistence of symptomsafter surgery.	126
19	EMG/NCV/EP unit.	147
20	Stimulating electrode.	148
21	Ground electrode.	148
22	Recording electrodes.	148
23	Median motor recording sites.	149
24	Median sensory recording sites.	149
25	Ultrasonographic device.	150
26	Comparison between the patients & controls regarding age(years).	153
27-A	Frequency distribution of PD patients regarding Sex.	154
27-В	Frequency distribution of the Controls regarding Sex.	154
28-A	Frequecy of clinical data in PD patients.	157
28-B	Frequecy of grades of PD patients.	157
29	Comparison between patients with and without CTS regarding median distal motor latencey/ms.	163
30	Comparison between the patients & controls regarding U/S findings.	168