Musculoskeletal Problems among Egyptian Type 1 diabetic patients

Thesis

Submitted for Partial Fulfillment of Master Degree in Pediatrics

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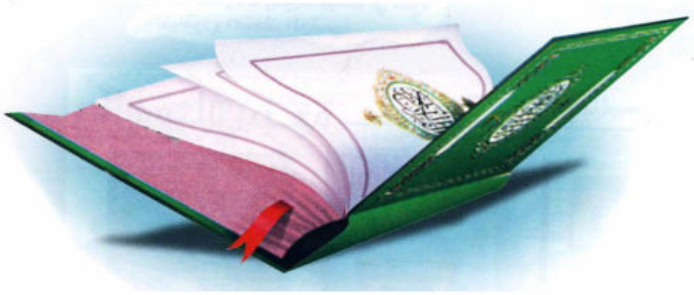
بسم الله الرحمن الرحيم

﴿ قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ ﴾

صدق الله العظيم

﴿سورة البقرة: ٣٢﴾



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الرؤية والرسالة

رؤية الكلية

تصبو كلية الطب جامعة عين شمس أن تكون الأولى بمنطقة الشرق الأوسط لتخريج أطباء ذوى قدرات تنافسية وأن تقود الإصلاح فى التعليم الطبى.

رسالة الكلية

تقوم كلية الطب جامعة عين شمس بإعداد خريج مدرب ذى مهارة تنافسية على المستوى المحلى والإقليمى، وقادر على التعليم والتعلم والتدرب مدى الحياة وملتزم بمعايير الخدمة الطبية والأخلاق المهنية وتسعى الكلية إلى التطوير المستمر للبرامج والمقررات ودعم وتطوير البحث العلمى مع التوسع فى الأبحاث العلمية التطبيقية وبرامج الرعاية الصحية لخدمة احتياجات المجتمع وتنمية البيئة

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List of Abbreviations

Abb.	Full term
ACEI ..... :	Angiotensin converting enzyme inhibtor
ACR..... :	Albumin/creatinine ration
ADA ..... :	American diabetes association
AER..... :	Albumin excretion rate
AGEs..... :	Advanced glycation end-products
AKR1B1..... :	Aldo-Keto Reductase Family 1 Member B1
ARB..... :	Angiotensin receptor blockers
BMD..... :	Bone mineral density
BMI ..... :	Body mass index
BP ..... :	Blood pressure
CAN ..... :	Cardiovascular autonomic neuropathy
CMAP ..... :	Compound muscle action potential
CNS..... :	Central nervus system
CO2 ..... :	Carbon dioxide
CPK..... :	Creatine kinase
CRPS..... :	Complex regional pain syndrome
CTS ..... :	Carpal tunnel syndrome
CVD ..... :	Cardio vascular disease
DAN ..... :	Diabetic autonomic neuropathy
DC ..... :	Dupuytren's contracture
DCCT ..... :	Diabetes Control and Complications Trials
DIF..... :	Distal interphalangeal
DISH..... :	Diffuse idiopathic skeletal hyperostosis
DSHS ..... :	Diabetic Stiff Hand Syndrome

List of Abbreviations (Cont...)

Abb.	Full term
DKA ..... :	Diabetic ketoacidosis
DM ..... :	Diabetes mellitus
DMI..... :	Diabetic muscle infarction
DNA ..... :	Deoxyribonucleic acid
DNE ..... :	Diabetic neuropathy
DPN ..... :	Diabetic peripheral neuropathy
EDB ..... :	Extensor digitorum brevis
EDIC..... :	Eurpean diabetes intervention and complication
EDTA..... :	Ethylene diamine tetra-acetic acid
EMG..... :	Electro myograph
eNOS ..... :	Endothelial nitric oxide synthase
FBG..... :	Fasting blood glucose
FFA..... :	Free fatty acid
GDM ..... :	Gestational diabetes mellitus
GFAT ..... :	Glutamine: fructose-6 phosphate amidotransferase
GFR..... :	Glomerular filtration rate
GH..... :	Growth hormne
GIT..... :	Gastro intestinal tract
HADD ..... :	Hydroxyapatite Deposition Disease
HAQ..... :	Health assessment questionnaire
HAZ..... :	Mean height
HbA1c ..... :	HemoglobinA1c

List of Abbreviations (Cont...)

Abb.	Full term
HDL ..... :	High density lipo-protien
HHS ..... :	Hyperglycemic hyperosmolar state
HIV ..... :	Human immunodeficiency virus
HNF 1A..... :	Hepatocyte nuclear factor 1-alpha
HNF 4A..... :	Hepatocyte nuclear factor 4-alpha
IDF..... :	International diabetes federation
IGF-1..... :	Insulin –like growth factor 1
IgG ..... :	Immuno globulin G
ISPAD..... :	International society for pediatric and adolescent diabetes
KCNJ11..... :	Potassium voltage-gated channel subfamily J member 11
L.L..... :	Lower limb
LDL..... :	Low density lipoprotein
LJM..... :	Limited joint mobility
MCP ..... :	Metacarpophalangeal
MODY..... :	Maturity onset diabetes of the young
MRI ..... :	Magnetic resonance imaging
MSK..... :	Musculo-skeletal complication
NAD ..... :	Nerve action potential
NCS..... :	Nerve conduction study
NCV ..... :	Nerve conduction velocity
NGSP..... :	National Glycohemoglobin Standardization Program
NO ..... :	Nitric oxide

List of Abbreviations (Cont...)

Abb.	Full term
OGTT ..... :	Oral Glucose Tolerance Test.
OR ..... :	Odds ratio
PAD..... :	Peripheral artery disease
PH ..... :	Potential of hydration
PIF ..... :	Proximal interphalangeal
PKC..... :	Protien kinase c
RAGEs ..... :	Receptor for AGEs
ROS..... :	Reactive oxygen species
SEM ..... :	Standard error of the mean
SHS..... :	Shoulder-Hand-Syndrome
SNAP ..... :	Sensory nerve action potential
T1DM..... :	Type 1 diabetes mellitus
T2DM..... :	Type 2 diabetes mellitus
UDP ..... :	Uridine diphosphate
UKPDS ..... :	U.K. Prospective Diabetes Study)
UL ..... :	Upper limb
WAZ ..... :	Mean height
WHO ..... :	World health organization
ZAC/ HYMAI .. :	Zinc finger protein associated with apoptosis and cell cycle arrest/imprinted in hydatidiform mole

INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease of high morbidity and mortality. Type 1 Diabetes Mellitus (T1DM) results from a complete deficiency of insulin due to autoimmune-mediated destruction of insulin-producing β cells in the pancreas ***(Alzokm et al., 2015).***

Diabetes mellitus is considered as an epidemic in the modern world and much of its morbidity and mortality is related to micro- and macro-vascular complications. However, it is also associated with musculoskeletal (MSK) disorders of the hand and shoulder that can be very incapacitating and significantly compromise the quality of life ***(Alzokm et al., 2015).***

The exact pathophysiology of most of these musculoskeletal disorders remains obscure, however, connective tissue disorders, neuropathy or vasculopathy may have a synergistic effect on the increased incidence of MSK disorders in DM. Hyperglycemia, insulin levels and genetic variations have been implicated in the pathogenesis of skeletal abnormalities seen with DM ***(Browne et al., 2001).***

Diabetes mellitus may affect the MSK system in a variety of ways. The metabolic perturbations in DM including glycosylation of proteins; micro-vascular abnormalities with damage to blood vessels and nerves; and collagen accumulation

in skin and peri-articular structures result in changes in the connective tissue ***(Halesha and Krishnamurthy, 2014).***

Whilst vascular complications are recognized as the principal cause of morbidity and mortality in DM, it is often forgotten that DM is a multi-system disease. Despite the increased prevalence of MSK disorders amongst the diabetic population, this area is frequently neglected in the clinic setting. Certain connective tissue diseases such as cheiroarthropathy are almost exclusively associated with DM whilst others such as Dupuytren's and carpal tunnel syndrome occur more frequently in the diabetic population ***(Browne et al., 2001).***