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مقدمة من

الطبيبة/ عبير حسن محمد حسن

تحت اشراف

الأستاذ الدكتور/ أحمد كامل مرتجي

أستاذ طب وصحة المسنين

كلية الطب- جامعة عين شمس

الدكتور/ ساره أحمد حمزه

أستاذ مساعد طب وصحة المسنين

كلية الطب- جامعة عين شمس

الدكتور/ محمد زين عبد الودود

مدرس طب وصحة المسنين

كلية الطب -جامعة عين شمس

كلية الطب

جامعة عين شمس

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Relationship Between Body Mass Index and Primary Osteoporosis in Elderly Egyptian.

Thesis

Submitted for partial fulfillment of Master degree in Geriatric Medicine

By

Abeer Hassan Mohammed
M.B.B.CH

Supervised By

Prof. Dr. Ahmed Kamel Mortagy
Professor of Geriatric Medicine
Faculty of Medicine
Ain Shams University

Dr. Sarah Ahmed Hamza
Assisstant professor of Geriatric Medicine
Faculty of Medicine
Ain Shams University

Dr. Mohammed Zein Abdelwadoud
Lecturer of Geriatric Medicine
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University
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List of Abbreviations

ACTH····· Adrenocorticotropic hormone

ADL ····· Activities of daily life

AIDS ····· Autoimmune deficiency syndrome

BMD……..Bone Mineral Density

BMI……Body Mass Index

BSAP…….....Bone specific alkaline phosphatase

CA……..Calcium

COPD…….Chronic Obstructive Pulmonary Disease

CTx…….C -telopeptide of collagen cross-links

CVD……...Cardiovascular disease

DEXA…….Dual Energy X-ray Absorptiometry

DPA……....Dual-photon Absorptiometry

Dpd……....deoxypyridinolines

DRA……...Dual energy Radiographic Absorptiometry

FDA……..….Food-Drug administration

FRAX……..Fracture Risk Assessment Tool

g/cm^2……..….gram/square centimeter

GnRH…….....Gonadotropin-releasing hormone

IADL……Instrumental Activity of daily living

ICTP…...……Cross-linked C -telopeptide of type I collagen

List of Abbreviations (Cont.)

Kg/m2…… Kilogram/square meter

MRI…….. Magnetic Resonance Imaging

NOF……National osteoporosis foundation

NTx…….....N –telopeptide of collagen cross-links

OC……..... Osteocalcin

OPG…….....Osteoprotegerin

PICP……...Carboxyterminal propeptide of type I collagen

PINP…….....Aminoterminal propeptide of type I collagen

PO4…….....Phosphorus

PTH……Parathyroid hormone

Pyd……. Pyridinolines

QCT…… Qquantitative computed tomography

QTLs…… Quantitative trait loci

RANK…… Receptor activator of nuclear factor Kappa-B ligand

RANKL..... Receptor activator of nuclear factor kappa-B ligand

RI …… Recombinant inbred

SD…… Standard Deviation

SERMs…… Selective estrogen receptor modulators

SPA…… Single-photon absorptiometry

SPECT…… Single-photonemission computed tomography

SPSS…… Statistical Package for Social Sciences

T2DM …… Type2 diabetes mellitus

List of Abbreviations (Cont.)

T-FN BMD……T-score of Femur Neck Bone Mineral Density

T-LS BMD……T-score of Lumbar Spine Bone Mineral Density

US……United States

WHO……The world health organization

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Abeer Hassan

Introduction

Osteoporosis is accelerated bone loss. Normally, there is loss of bone mass with aging, perhaps 0.7% per year in adults. However, bone loss is greater in women past menopause than in men of the same age. The process of bone remodeling from resorption to matrix synthesis to mineralization normally takes about 8 months; a slow but constant process. Bone in older persons is not as efficient as bone in younger persons at maintaining itself. There is decreased activity of osteoblasts and decreased production of growth factors and bone matrix ***(Sambrook and Cooper, 2006).***

Osteoporosis is a systemic disease in which bone density is reduced leading to the weakening of the skeleton and increase vulnerability to fractures ***(Wells et al., 2005).***

It is called silent disease since there are few associated symptoms; osteoporotic fracture is chief clinical feature with an enormous burden on the health related quality of life and mortality ***(Bagnato et al., 2007).***

Osteoporosis can be classified as primary or secondary. Primary osteoporosis is simply the form seen in older persons and women past menopause in which bone loss is accelerated over that predicted for age and sex. Secondary osteoporosis results from a variety of identifiable conditions ***(Sweet et al., 2009).***

Several studies discussed the relation between Body Mass Index and osteoporosis, ***Nguyen, 2000*** found that body weight or body mass index (BMI) is positively associated with BMD.

Some epidemiological data show that higher body weight or BMI is positively correlated with bone mass, and weight loss may cause bone loss ***(Guney et al., 2003; Radak, 2004 and Gnudi et al., 2007).*** If so, increasing BMI in postmenopausal women is assumed to protect against osteoporosis ***(Reid et al., 1992; Felson et al., 1993).*** Furthermore, weight loss may increase significantly bone resorption markers, suggesting that body weight directly influences osteoclastic activity ***(Hyldstrup et al., 1993).***

Ricci et al. (2001) support this hypothesis, in a cross-sectional study with 100 healthy postmenopausal women; it was observed that BMI is inversely related to serum tartrate-resistant acid phosphatase activity.

Still the relation between BMI and Osteoporosis is considered a research question in several studies and also how obesity can affect osteoporosis ***(Greco et al., 2010).***

Aim of the Work

To detect the relationship between body mass index and primary osteoporosis in elderly Egyptian.

Osteoporosis

Introduction to Osteoporosis

Osteoporosis is accelerated bone loss. Normally, there is loss of bone mass with aging, perhaps 0.7% per year in adults. However, bone loss is greater in women past menopause than in men of the same age. The process of bone remodeling from resorption to matrix synthesis to mineralization normally takes about 8 months, a slow but constant process. Bone in older persons just isn't as efficient as bone in younger persons at maintaining itself. There is decreased activity of osteoblasts and decreased production of growth factors and bone matrix ***(Sambrook and Cooper, 2006).***

The World Health Organization (WHO) has defined osteoporosis as a spinal or hip bone mineral density (BMD) that is 2.5 standard deviations or more below the mean BMD for healthy, young women, measured by Dual Energy X-ray Absorptionmetry (DEXA). The WHO defines osteopenia as a spinal or hip BMD between 1 and 2.5 standard deviations below the mean for healthy, young women ***(WHO, 2009).***

Osteoporosis affects 10 million women and men in the United States, with direct costs of $17 billion in 2005 ***(Burge et al., 2007).***

The prevalence of osteoporosis in men over the age of 50 years is 3 times less frequent than in women ***(Kanis et al., 2008).***

Pathophysiology of Osteoporosis

The overall architecture of bone is divided into cancellous bone (also referred to as trabecular bone) and cortical bone; because the surface area of cancellous bone far exceeds that of cortical bone, and is more metabolically active, cancellous bone is more severely affected if bone remodeling becomes uncoupled. During the accelerated period of bone loss immediately after menopause, cancellous bone loss increases 3-fold, while rates of cortical bone loss are slower, because the vertebrae are rich in cancellous bone, vertebral fractures are relatively common in the early postmenopausal years, with hip fractures tending to occur in later years ***(American Medical Association, 1998).***

Approximately half of the bone mass is accumulated during pubertal development ***(Bonjour et al., 1991).*** This is associated with the increase in sex hormone levels and is almost completed with closure of the end plates. There is only minimal additional accumulation of the bone minerals during the next 5 to 15 years (skeletal consolidation).

Genetic factors have long been recognized as playing an important role in osteoporosis ***(Zintzaras et al., 2006).***

The main factor influencing peak bone mass is genotype. The genes implicated in osteoporosis include those for the estrogen receptor, transforming growth factor-β, and Apo-lipoprotein E and collagen ***(Skugor, 2010).***