



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكرو فيلم

# بسم الله الرحمن الرحيم



**MONA MAGHRABY**



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# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

### قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



### يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**MONA MAGHRABY**

# **PREVALENCE OF VERTEBRAL OSTEOPOROTIC FRACTURES IN ELDERLY DIABETIC FEMALE PATIENTS**

Thesis

Submitted for Partial Fulfillment of Master Degree  
**In Geriatrics and Gerontology**

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## List of Abbreviations

| <b>Abb.</b>         | <b>Full term</b>                                      |
|---------------------|-------------------------------------------------------|
| <b>A.P</b> .....    | Antro-posterior                                       |
| <b>AACE</b> .....   | American association of clinical endocrinologist      |
| <b>ACE</b> .....    | American College of endocrinology                     |
| <b>ADL</b> .....    | Activity of Daily Living                              |
| <b>AGEs</b> .....   | Advanced glycation end product                        |
| <b>aP2</b> .....    | Adipocyte fatty acid-binding protein                  |
| <b>ATP</b> .....    | Adenosine triphosphate                                |
| <b>AUC</b> .....    | Area under the curve                                  |
| <b>BMD</b> .....    | Bone mineral density                                  |
| <b>BMI</b> .....    | Body mass index                                       |
| <b>CAPMAS</b> ..... | Central agency of public mobilization and Statistics  |
| <b>CAROC</b> .....  | Canadian Association of radiologists and osteoporosis |
| <b>CHD</b> .....    | Coronary heart disease                                |
| <b>CI</b> .....     | Confidence interval                                   |
| <b>COPD</b> .....   | Chronic obstructive pulmonary disease                 |
| <b>CT</b> .....     | Computed tomography                                   |
| <b>CVA</b> .....    | Cerebrovascular accidents                             |
| <b>DM</b> .....     | Diabetes mellitus                                     |
| <b>DXA</b> .....    | Dual energy x ray absorptiometry                      |
| <b>ESRD</b> .....   | End-stage renal disease                               |
| <b>EUR</b> .....    | Euro                                                  |
| <b>FDA</b> .....    | Food and drug administration                          |
| <b>FRAX</b> .....   | Fracture risk assessment tool                         |
| <b>GFR</b> .....    | Glomerular filtration rate                            |

## List of Abbreviations (Continued)

| <b>Abb.</b>           | <b>Full term</b>                                                    |
|-----------------------|---------------------------------------------------------------------|
| <b>HbA1C</b> .....    | Glycated hemoglobin                                                 |
| <b>IADL</b> .....     | Instrumental Activity of Daily Living                               |
| <b>IDF-MENA</b> ..... | International Diabetes Federation -<br>Middle East and North Africa |
| <b>IU</b> .....       | International unit                                                  |
| <b>IV</b> .....       | Intra venous                                                        |
| <b>K.V</b> .....      | Kilo volt                                                           |
| <b>LR</b> .....       | Diagnostic odd ratio                                                |
| <b>LR-</b> .....      | Negative likelihood ratio                                           |
| <b>LR+</b> .....      | Positive likelihood ratio                                           |
| <b>M.A</b> .....      | Milli amber                                                         |
| <b>M.AS</b> .....     | milli amber per second                                              |
| <b>MCSF</b> .....     | Macrophage colony-stimulating factor                                |
| <b>MHT</b> .....      | Menopausal Hormone Therapy                                          |
| <b>MI</b> .....       | Myocardial infarction                                               |
| <b>MNA</b> .....      | Mini nutritional assessment                                         |
| <b>MRI</b> .....      | Magnetic resonance imaging                                          |
| <b>NAM</b> .....      | National academy of medicine                                        |
| <b>NICE</b> .....     | National Institute for Health and<br>Care Excellence.               |
| <b>NOF</b> .....      | National osteoporosis foundation                                    |
| <b>NPV</b> .....      | Negative Predictive Value                                           |
| <b>OVF</b> .....      | Osteoporotic vertebral fracture                                     |
| <b>PAD</b> .....      | Peripheral arterial disease                                         |
| <b>PHQ2</b> .....     | Patient health questionnaire-2                                      |
| <b>PHQ9</b> .....     | Patient health questionnaire -9                                     |
| <b>PO</b> .....       | Per oral                                                            |

## List of Abbreviations (Continued)

| <b>Abb.</b>                          | <b>Full term</b>                                        |
|--------------------------------------|---------------------------------------------------------|
| <b>PPV</b> .....                     | Positive Predictive Value                               |
| <b>PTH</b> .....                     | Parathyroid hormone                                     |
| <b>PTHrP</b> .....                   | Parathyroid Hormone Related-Protein                     |
| <b>PVD</b> .....                     | Peripheral Vascular Disease                             |
| <b>RANKL</b> .....                   | Receptor activator of nuclear factor- $\kappa$ B ligand |
| <b>Runx-2</b> .....                  | Runt-related transcription factor                       |
| <b>SD</b> .....                      | Standard deviation                                      |
| <b>SE</b> .....                      | Standard error                                          |
| <b>Sec</b> .....                     | Second                                                  |
| <b>SERMs</b> .....                   | Selective estrogen receptor modulators                  |
| <b>SNRIS</b> .....                   | Serotonin and norepinephrine reuptake inhibitors        |
| <b>SSRIs</b> .....                   | Selective serotonin reuptake inhibitors                 |
| <b>T1D</b> .....                     | Type 1 diabetes                                         |
| <b>T2D</b> .....                     | Type 2 Diabetes                                         |
| <b>TNF-<math>\alpha</math></b> ..... | Tumor necrosis factor $\alpha$                          |
| <b>TSEC</b> .....                    | Tissue-Specific Estrogen Complex                        |
| <b>TUG-T</b> .....                   | Time up and go test time                                |
| <b>TZDs</b> .....                    | Thiazolidinediones                                      |
| <b>U.S.</b> .....                    | United States                                           |
| <b>USD (\$)</b> .....                | United States Dollar                                    |
| <b>VFA</b> .....                     | Vertebral fracture assessment                           |
| <b>VF</b> s .....                    | Vertebral fractures                                     |
| <b>WHO</b> .....                     | World health organization                               |

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## **INTRODUCTION**

Diabetes mellitus is a metabolic disorder with great health and social impact. The international diabetes federation (IDF) estimated that the number of adults with diabetes was 451 million adults in 2017 and is expected to rise to 693 million by 2045.<sup>(1)</sup>

Diabetes mellitus (DM) is one of the top ten causes of death worldwide. Together with cancer, cardiovascular disease, and respiratory diseases, all of them account for 80% of all early non-communicable diseases deaths.<sup>(2)</sup> Diabetes mellitus is associated with many complications, which are due to severe metabolic disorders in the body. One of these complications is diabetic osteopathy, which increases the risk of fractures, leading to a high level of disability and mortality.<sup>(3)</sup>

In type 1 diabetes mellitus (T1DM), and as a result of defect in insulin secretion, bone formation slows down while bone resorption becomes relatively faster, leading to a decrease in bone mass density, impaired mineralization, and bone microarchitecture.<sup>(4)</sup> While, in type 2 Mellitus (T2DM), the exact mechanism of bone disease is still unclear <sup>(5)</sup>, however, several studies have found complex mechanisms that range from the cellular level with molecular alterations in cell signaling that alter the bone turnover, and cause changes in the microarchitecture and microvascular quality of bone.<sup>(6)</sup>

Osteoporotic fractures are one of the commonest types of fractures with great financial and health burdens. Besides that, they are considered a risk factor for the occurrence of subsequent fragility fractures.<sup>(7)</sup> It is estimated that one in every 3 women and one in every 5 men older than 50 years will experience an osteoporotic fracture in their life.<sup>(8)</sup> Additionally, it is estimated that there are 9 million worldwide osteoporotic fractures annually by a rate of one fracture every 3 seconds which amounts to almost 25000 fractures per day, and 70% percent of these cases are women.<sup>(9,10,11)</sup>

In Europe, fragility fractures come in the 4<sup>th</sup> rank of the most common chronic comorbid disease after ischemic heart disease, dementia, and lung diseases. Besides this marked health burden, it costs about 37 billion EUR annually.<sup>(11,12)</sup>

In the United States, osteoporosis and fragility fractures are considered a major health problem and financial burden. It spends between 10 to 17 billion USD annually<sup>(13)</sup>, with the expectation to rise to 25.3 billion USD in 2025<sup>(14)</sup>, while it is estimated to be 30.9 billion USD annually in the European Union in 2025.<sup>(15)</sup>

The hip, vertebrae, and forearm are the classic sites for osteoporotic or fragility fractures.<sup>(16)</sup> The presence of a