# العلاقة بين كثافة العظام فى الفك السفلى و الفقرات القطنية فى مرضى هشاشة العظام باستخدام الاشعة المقطعية الكمية

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كجزء من مقومات الحصول على درجة الدكتوراة فى أشعة الفم

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بسم الله الرحمن الرحيم

" قالوا سبحانك لا علم لنا الا ما علمتنا
انك أنت العليم الحكيم"

صدق الله العظيم

(البقرة آية 32)

# Relationship Between Mandibular And Lumbar Bone Mineral Density In Osteoporotic Patients With Quantitative Computerized Tomography (QCT)

***Thesis***

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# Abstract

Osteoporosis is a skeletal disease characterized by low bone mass that was thought to affect the jaw bones. In the current study, twenty females aged between 40 and 70 years were selected and screened by DXA scan of spine, femur and forearm. According to the resultant T-scores, they were categorized into normal group (five patients), osteopenic group (seven patients) and osteoporotic group (eight patients).The patients were further subjected to QCT examinations of both spine and mandible. Our results showed that on comparing the three groups concerning the mandibular BMD measurements by QCT, no statistically significant difference was found between the normal, osteopenic and osteoporotic groups regarding the buccal cortex, the lingual cortex or the trabecular bone. We concluded that systemic osteoporosis is not necessarily associated with mandibular osteoporosis and that the disease is not an absolute contraindication for dental implants placement.



**Key words:** Osteoporosis, DXA, T-scores, QCT, buccal cortex, lingual cortex, trabecular bone, dental implants.



# الملخص العربى

هشاشة العظام هو مرض يتميز بانخفاض كتلة العظام وفى السابق كان من المعتقد أنه يؤثر أيضا على عظام الفك. في الدراسة الحالية، تم اختيارعشرين من الإناث اللاتى تتراوح أعمارهن بين أربعين و سبعين عاما. وقد تم تصنيفهن على اساس نتائج جهاز قياس امتصاص الأشعة السينية ثنائى الطاقة لفحوصات العمود الفقري ، وعظم الفخذ والساعد الى مجموعة الاصحاء ( و تتكون من خمسة اناث) ، مجموعة مريضات قلة العظم (وتتكون من سبعة مريضات)، ومجموعة مريضات هشاشة العظام ( و تتكون من ثمانية مريضات). كما تم فحص المريضات باسنخدام جهاز الأشعة المقطعية الكمية لكل من العمود الفقري والفك السفلي.

وقد كشفت نتائج الدراسة عندما تم تحليلها إحصائيا أن الفك السفلي لا يتأثر بالضرورة بتطور مرض هشاشة العظام ، و إنه لا يعكس خصائص باقى الهيكل العظمي. وإذاكان هناك تأثيرا، فان التأثير القوى قد يظهر على لوحة الشدق القشرية و تكوينها.

**كلمات مفتاحية**: هشاشة العظام، كتلة العظام، جهاز قياس امتصاص الأشعة السينية ثنائى الطاقة ، جهاز الأشعة المقطعية الكمية، لوحة الشدق القشرية.

# Recommendations

- Further studies using QCT, on a larger sample size including both sexes are needed to assess the exact effects of osteoporosis on the maxillofacial region exploring more different maxillary and mandibular regions.
- More epidemiological studies using QCT including a long follow-up period of osteoporotic patients receiving dental implants in different jaw regions are necessary to reach more precise conclusions about the disease progression rate in both jaws.
- Further studies should be directed to employ the 3D QCT to perform an accurate evaluation of bone growth, the healing of fractures and the value of orthodontic anchorage.
- Regular screening programs should be installed for Egyptian females after 40 years either pre or postmenopausal to assess regularly their BMD at different skeletal sites. The detection of any osteopenic changes should be followed by the start of a careful therapeutic and preventive program to avoid the progression of the disease.
- Educational courses should be directed to women, mostly susceptible to osteoporosis, in all the society fields about this silent epidemic disease, its preventive measures, the importance of its early diagnosis and the detrimental effects of the osteoporotic-related fractures on their health.

# List of abbreviations

| | |
|---|---|
| 2D | Two dimensions |
| 3D | Three dimensions |
| BCBMD | Buccal cortical bone mineral density |
| BMC | Bone mineral content |
| BMD | Bone mineral density |
| BMU | Basic multicellular unit |
| BON | Bisphosphonate-associated osteonecrosis |
| BP | Bisphosphonate |
| CT | Computed Tomography |
| DPA | Dual-Photon Absorptiometry |
| DXA | Dual energy X-ray absorptiometry |
| ESR | Erythrocyte sedimentation rate |
| FEA | Finite element analysis |
| hrCT | High resolution computed tomography |
| HU | Hounsefield Unit |
| KVP | Kilovoltage peak |
| LCBMD | Lingual cortical bone mineral density |
| mA | milliamperage |
| MDCT | Multi-Detector Computed Tomography |
| MR | Magnetic Resonance |
| MTF | Modulation transfer function |
| ONJ | Osteonecrosis of the jaw |
| pQCT | Peripheral Quantitative computed tomography |
| PTH | Parathyroid hormone |
| QCT | Quantitative computed tomography |
| QUS | Quantitative Ultrasonography |
| ROI | Region of interest |
| SD | Standard deviation |
| SFOV | Scanned field of view |
| SPA | Single-Photon Absorptiometry |
| SXA | Single X-ray Absorptiometry |
| TBMD | Trabecular bone mineral density |
| VOI | Volume of interest |
| vQCT | Volumetric Quantitative computed tomography |
| WHO | World Health Organization |

| | |
|---|---|
| μm | Micrometer |
| μSv | Micro Sievert |

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