Effects of Serum 25-Hydroxyvitamin D Level on Decreased Bone Mineral Density at Femoral Neck and Total Hip in Chinese Type 2 Diabetes

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Abstract

Citation: Liting Guo: Department of Endocrinology Effects of Serum 25-Hydroxyvitamin D Level on Decreased Bone Mineral Density at Femoral Neck and Total Hip in Chinese Type 2 Diabetes. **protocols.io**
dx.doi.org/10.17504/protocols.io.kjycupw
Published: 02 Nov 2017

Protocol

Step 1.
Subjects and MethodsThree hundred and sixty-eight patients with type 2 diabetes were randomly selected at the endocrinology department of General Hospital in Tianjin Medical University and Teda International Cardiovascular Hospital in Tianjin from January 2014 to June 2016. The subjects included 165 males and 203 females. The ages of subjects ranged from 40-79. At the same time, three hundred non-diabetic subjects matched for age, Body Mass Index (BMI) and history of smoking and alcoholism were selected at the two hospitals mentioned above. The study protocol was approved by the Independent Ethics Committee (IEC) of Teda International Cardiovascular Hospital. All subjects gave written consent for participation.

Step 2.
Inclusion criteriaType 2 diabetes mellitus conformed to the 1999 WHO Diagnostic Criteria. Non-diabetic subjects had a normal blood sugar, blood lipids and blood pressure.

Step 3.
Exclusion criteriaSubjects excluded with hyperthyroidism, hyperparathyroidism and Paget’s disease. Subjects receiving corticosteroids, gonadal hormones, immunosuppressant or anticonvulsants medications were excluded from both groups. Subjects on thiazolidinediones from diabetes group were also excluded. Subjects with severe hepatopathy, nephropathy and neoplastic diseases were also excluded. Subjects did not take drugs affecting bone metabolism (such as vitamin D and its derivatives, calcium, diphosphonate) within six months. No Female subjects were pregnant or lactating.

Step 4.
BMD measurementsThe BMDs (g/cm2) was measured at the lumbar spine (L1-L4), femoral neck, total hip, and total body by LUNAR's DEXA dual-energy X-ray absorptiometry. To eliminate technical variation, the same operator measured all subjects. The values of the BMD at the lumbar spine are presented as the mean of the L1-L4 values. T scores were calculated on the basis of the normal reference values in the age and gender-matched Chinese group. Based on the WHO diagnostic criteria, patients were diagnosed with osteoporosis if their BMD was < -2.5 SD, diagnosed with osteopenia if their BMD was between -1.0 and -2.5 SD, and they were considered to have a normal BMD if their BMD was > - 1.0 SD.

Step 5.
Grouped: Type 2 diabetic patients were divided into groups according to the diabetes duration and hemoglobin A1c (HbA1c) level: the diabetes duration ≤10 years group and the diabetes duration>10 years group; the HbA1c ≤8% group and the HbA1c >8% group.Biochemical Measurements