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Original Research

Assessment of risk of fracture in older women with diabetes

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ABSTRACT:
Background: Diabetes mellitus is generally is considered a risk factor for fracture among older women. The present study was conducted to assess risk of fracture in older women with diabetes. **Materials & Methods:** 82 women were divided into 2 groups based on with type II diabetes. Group I had type II diabetes women and group II had normal women. A history of fall in the last year was noted. History of a low trauma fracture in adult life was obtained in all patients. Weight, height, waist circumference, lying and standing heart rate, and blood pressure were measured. Bone density measurements were carried out using dual-energy X-ray absorptiometry (DXA). **Results:** The mean age (years) was 65.4 in group I and 68.2 in group II, height (cm) was 158.2 in group I and 158.1 in group II and BMI (kg/m2) was 29.2 in group I and 26.4 in group II, falls in year before baseline was seen in 14 in group I and 8 in group II. The difference was significant (P< 0.05). Calcaneal BMD (g/cm2) was 0.448 in group I and 0.402 in group II, calcaneal BMD at visit 4 (g/cm2) was 0.409 in group I and 0.398 in group II, distal radius BMD (g/cm2) was 0.394 in group I and 0.354 in group II and femoral neck BMDc (g/cm2) was 0.684 in group I and 0.642 in group II respectively. The difference was significant (P< 0.05). **Conclusion:** Diabetes is a risk factor for fractures among older women, suggesting that fracture prevention efforts should be a consideration in the treatment of diabetes.
Key words: Diabetes, Bone mineral density, osteoporosis

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INTRODUCTION

Osteoporotic fractures are associated with significant morbidity, mortality, and reduction in quality of life. Known risk factors associated with the development of osteoporosis and fractures include female gender, older age, lower body mass index (BMI), and family history.[1] Diabetes is not well recognized as a risk factor for fractures, despite increasing evidence of association. Studies have reported lower bone mineral density (BMD) and increased risk of fractures (6.9- to 12-fold increase) in patients with type 1 diabetes.[2]

Diabetes mellitus is generally is considered a risk factor for fracture among older women. Previous studies evaluating the association between diabetes and fracture have produced useful results.[3,4]There is increasing evidence that the risk of fractures is increased in older women with type 2 diabetes mellitus (type 2 DM).[5] This has important implications as diabetes and fractures are common in older patients, with the prevalence of diabetes being 6.5% in those aged over 75 years; in the United Kingdom approximately 40,000 low trauma hip fracture occur per annum in women.[6] The increased fracture risk associated with type 2 DM is due to either poor bone quality (not captured by BMD measurements) or extra-skeletal risk factors such as increased rates of falling.[7]The present study was conducted to assess risk of fracture in older women with diabetes.

MATERIALS & METHODS

The present study comprised of 82women. The consent was obtained from all enrolled patients.

Data such as name, age etc. was recorded. They were divided into 2 groups based on with type II diabetes. Group I had type II diabetes women and group II had normal women. Medication usage, comorbidities, and physical activity was noted. A history of fall in the last year was noted. History of a low trauma fracture

in adult life was obtained in all patients. Weight, height, waist circumference, lying and standing heart rate, and blood pressure were measured. Bone density measurements were carried out using dual-energy X-ray absorptiometry (DXA). Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Group I (50)	Group II (32)	P value
Age (mean)	65.4	68.2	0.91
Height (cm)	158.2	158.1	0.94
BMI (kg/m2)	29.2	26.4	0.12
Falls in year before baseline	14	8	0.04

Table I, graph I shows thatmean age (years) was 65.4 in group I and 68.2 in group II, height (cm) was 158.2in group I and 158.1in group II and BMI (kg/m2) was 29.2in group I and 26.4in group II, falls in year before baseline was seen in 14in group I and 8in group II. The difference was significant (P< 0.05).

Graph I Baseline characteristics

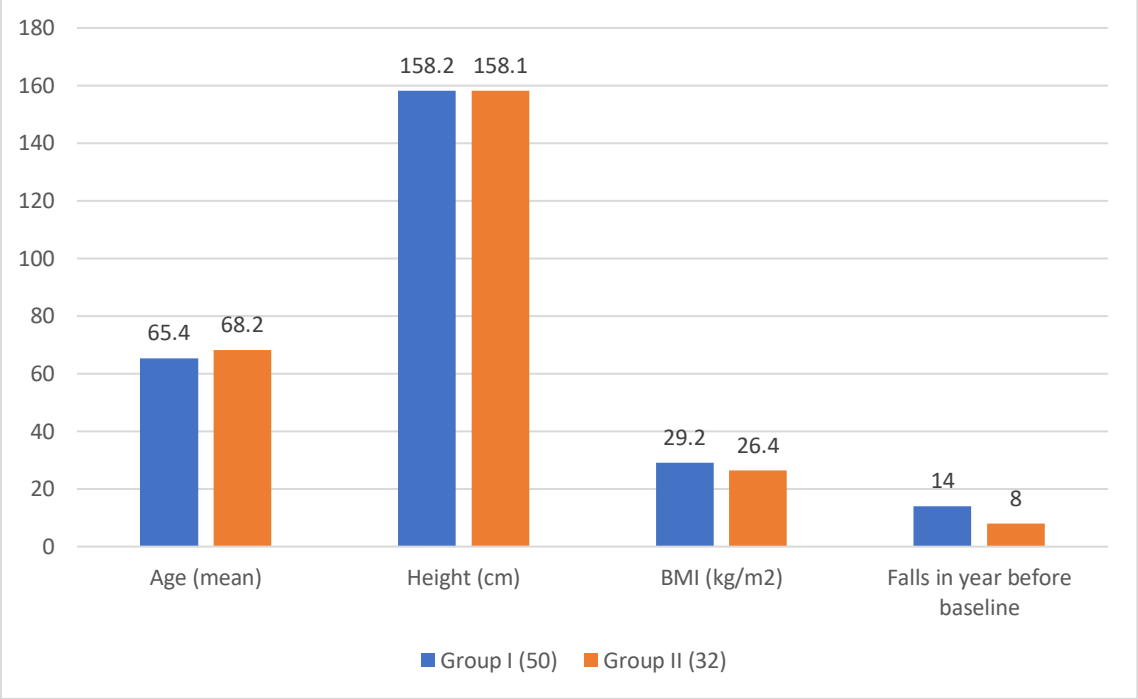
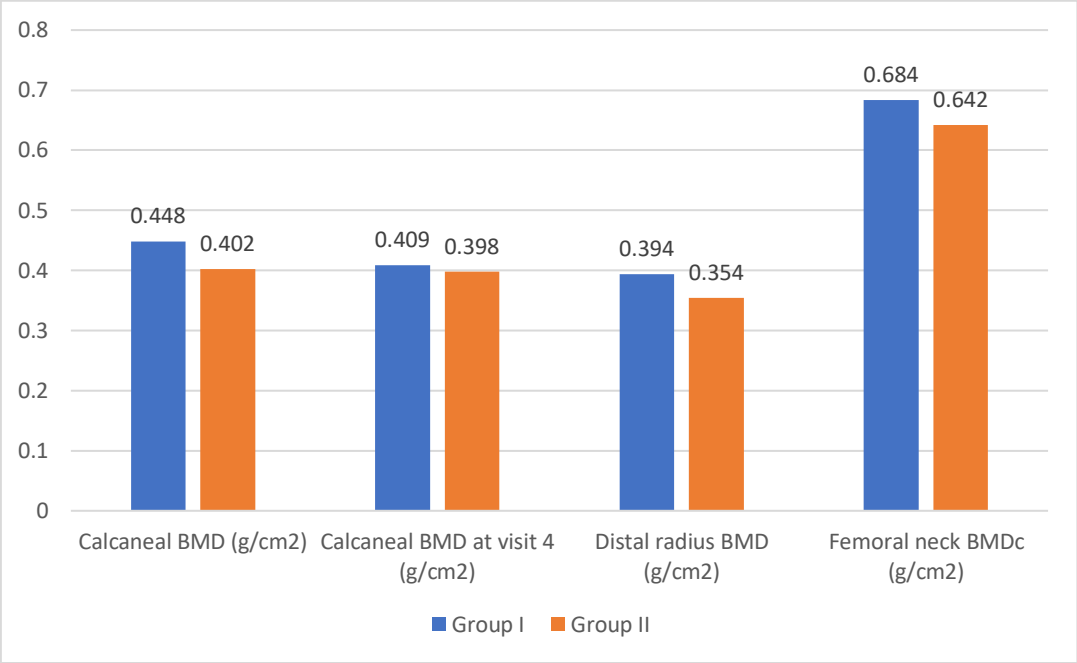


Table II Assessment of bone mineral density

BMD	Group I	Group II	P value
Calcaneal BMD (g/cm2)	0.448	0.402	0.02
Calcaneal BMD at visit 4 (g/cm2)	0.409	0.398	0.05
Distal radius BMD (g/cm2)	0.394	0.354	0.01
Femoral neck BMDc (g/cm2)	0.684	0.642	0.03

Table II, graph II shows that calcaneal BMD (g/cm2) was 0.448 in group I and 0.402in group II, calcaneal BMD at visit 4 (g/cm2) was 0.409in group I and 0.398in group II, distal radius BMD (g/cm2) was 0.394in group I and 0.354in group II and femoral neck BMDc (g/cm2) was 0.684in group I and 0.642in group II respectively. The difference was significant (P< 0.05).

Graph II Assessment of bone mineral density



DISCUSSION

Diabetes mellitus (DM) is considered a major global public health problem that is likely to be among the five leading causes of disease burden, with an estimated global prevalence of 4.4%, by 2030.[8] Age is an important factor, with the majority of patients with DM aged >65 years. Previous studies have confirmed the harmful impact of DM on the risk of vascular outcomes, cancer at different sites and renal dysfunction.[9] Due to DM, patients might have altered calcium metabolism, increased bone turnover and reduced bone mineral density (BMD),which in turn may influence the risk of fractures in patients with DM.[10] However, previous meta-analyses reported different strengths of association between DM and the risk of fractures in type 1 and type 2 DM (T1DM and T2DM, respectively),which highlights the need to verify and evaluate the association between DM and fracture at other sites.[11]The present study was conducted to assess risk of fracture in older women with diabetes.

We found that mean age (mean) was 65.4 in group I and 68.2 in group II, height (cm) was 158.2 in group I and 158.1 in group II and BMI (kg/m2) was 29.2 in group I and 26.4 in group II, falls in year before baseline was seen in 14 in group I and 8 in group II.Schwartz et al[12]determined whether type 2 diabetes is associated with fracture in older women. A total of 2624 women experienced at least one nonvertebral fracture during an average follow-up of 9.4 year, and 388 had at least one vertebral fracture during an average interval of 3.7 year. Although diabetes was associated with higher bone mineral density, it was also associated with a higher risk of specific fractures. Compared with nondiabetics, women with diabetes who were not using insulin had an increased risk of hip [relative risk (RR), 1.82; 95% confidence interval (CI), 1.24–2.69] and proximal humerus (RR, 1.94; 95% CI, 1.24–3.02) fractures in multivariate models controlling for age, body mass index, bone density, and other factors associated with fractures and diabetes. Insulin-treated diabetics had more than double the risk of foot (multivariate adjusted RR, 2.66; 95% CI, 1.18–6.02) fractures compared with nondiabetics.

We observed that calcaneal BMD (g/cm2) was 0.448 in group I and 0.402 in group II, calcaneal BMD at visit 4 (g/cm2) was 0.409 in group I and 0.398 in group II, distal radius BMD (g/cm2)was 0.394 in group I and 0.354 in group II and femoral neck BMDc (g/cm2) was 0.684 in group I and 0.642 in group II respectively.Patel et al[13]determined risk factors for falling and fracture in older women with type 2 DM. We randomly recruited 150 women from a community-based diabetes register. They underwent detailed clinical assessment, and BMD was measured by dual-energy X-ray absorptiometry (DXA) and heel quantitative ultrasound (QUS). Mean age was 74 years, mean duration of DM 11 years, mean body mass index 30 kg/m2, and mean HbA1c 7.6%. Mean BMD Z scores were significantly higher than the manufacturer's reference range for all skeletal sites. Previously, 53/150 (35%) of the women had reported a low trauma fracture. The fracture group did not differ significantly from the nonfracture group by age, diabetes-related risk factors or DXA BMD Z scores. However, QUS variables were lower in the fracture group (P = 0.04). A history of one or more falls in the previous 12 months was reported by 61/89 (41%) women. Fallers had a higher vibration perception threshold vs. nonfallers (mean 21.1 vs. 17.6 volts, respectively; P = 0.05). There were no other differences in diabetes or fall-related risk factors.

Bonds et al[14]determined the risk of fracture in postmenopausal women with type 2 diabetes and determines whether risk varies by fracture site, ethnicity, and baseline bone density. Postmenopausal women were compared with women without diagnosed diabetes and risk of fracture overall and at specific sites determined. All fractures and specific sites separately (hip/pelvis/upper leg; lower leg/ankle/knee; foot; upper arm/shoulder/ elbow; lower arm/wrist/hand; spine/tailbone) were measured. Bone mineral density (BMD) in a subset also was measured. The overall risk of fracture after 7 years of follow-up was higher in women with diabetes at baseline after controlling for multiple risk factors including frequency of falls. In a subsample of women with baseline BMD scores, women with diabetes had greater hip and spine BMD. The elevated fracture risk was found at multiple sites (hip/pelvis/upper leg; foot; spine/tailbone) among black women and women with increased baseline bone density.

CONCLUSION

Authors found that diabetes is a risk factor for fractures among older women, suggesting that fracture prevention efforts should be a consideration in the treatment of diabetes

REFERENCES

1. Piepkorn B, Kann P, Forst T, Andreas J, Pfutzner A, Beyer J. 1997 Bone mineral density and bone metabolism in diabetes mellitus. HormMetab Res. 29:584–591.
2. Heath H, Melton LJ, Chu CP. 1980 Diabetes mellitus and risk of skeletal fracture. N Engl J Med. 303:567–570.
3. Melchior TM, Sorensen H, Torp-Pedersen C. 1994 Hip and distal arm fracture rates in peri- and postmenopausal insulin-treated diabetic females. J Intern Med. 203–208.
4. Van Daele PL, Stolk RP, Burger H, et al. 1995 Bone density in non-insulindependent diabetes mellitus. The Rotterdam Study. Ann Intern Med. 122:409–414.
5. Forsen L, Meyer HE, Midthjell K, Edna TH. 1999 Diabetes mellitus and the incidence of hip fracture: results from the Nord-Trondelag Health Survey. Diabetologia. 42:920–925.
6. Meyer HE, Tverdal A, Falch JA. 1993 Risk factors for hip fracture in middleagednorwegian women and men. Am J Epidemiol. 137:1203–1211.
7. Cummings SR, Nevitt MC, Browner WS, et al. 1995 Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. N Engl J Med. 332:767–773.
8. Cummings SR, Black DM, Nevitt MC, et al. 1990 Appendicular bone density and age predict hip fracture in women. The Study of Osteoporotic Fractures Research Group. J Am Med Assoc. 263:665–668.
9. Farmer ME, White LR, Brody JA, Bailey KR. 1984 Race and sex differences in hip fracture incidence. Am J Public Health. 74:1374–1380.
10. Black DM, Palermo L, Nevitt MC, et al. Comparison of methods for defining prevalent vertebral deformities: the Study of Osteoporotic Fractures. J Bone Miner Res. 1995;10:890–902.
11. Kiel D. Assessing vertebral fractures. National Osteoporosis Foundation Working Group on Vertebral Fractures [published erratum appears in J Bone Miner Res. 10:1605, 1995]. J Bone Miner Res. 10:518–523.
12. Schwartz AV, Sellmeyer DE, Ensrud KE, Cauley JA, Tabor HK, Schreiner PJ, Jamal SA, Black DM, Cummings SR, Study of Osteoporotic Fractures Research Group. Older women with diabetes have an increased risk of fracture: a prospective study. The Journal of clinical endocrinology & metabolism. 2001 Jan 1;86(1):32-8.
13. Patel S, Hyer S, Tweed K, Kerry S, Allan K, Rodin A, Barron J. Risk factors for fractures and falls in older women with type 2 diabetes mellitus. Calcified tissue international. 2008 Feb;82(2):87-91.
14. Bonds DE, Larson JC, Schwartz AV, Strotmeyer ES, Robbins J, Rodriguez BL, Johnson KC, Margolis KL. Risk of fracture in women with type 2 diabetes: the Women's Health Initiative Observational Study. The Journal of clinical endocrinology & metabolism. 2006 Sep 1;91(9):3404-10.