Original Research

Incidence of long bone fractures among diabetic patients

[1]Dr. Mahesh Ghakke, [2]Dr. Vamshi Kiran Badam, [3]Dr. Manjusha

[1]Assistant Professor, Department of Medicine, NKP Salve Institute of Medical Sciences & Lata Mangeshkar Hospital, Nagpur, India
[2]Assistant Professor, Department of Medicine, Chalmeda Anandrao Medical College, Karimnagar, India
[3]Assistant Professor, Department of Neurology, Deccan Colleges of Medical Sciences, Hyderabad, Telangana, India

Corresponding author
Dr. Mahesh Ghakke
Assistant Professor, Department of Medicine, NKP Salve Institute of Medical Sciences & Lata Mangeshkar Hospital, Nagpur, India

Received: 02 January, 2020 Accepted: 15 February, 2020

Abstract

Background: Diabetes is an increasingly prevalent disease, with significant associated morbidity and mortality. Hence; the present study was conducted for assessing the Incidence of long bone fractures among diabetic patients.

Materials & methods: A total of 500 patients with type 2 diabetes were screened in the present study. All the patients belonged to the age range of 40 to 80 years. In all the patients, the duration of diabetes was more than 5 years. Complete demographic and clinical details of all the patients was obtained. A Performa was made and complete clinical details of all the patients was recorded separately. All the patients were asked about history of fractures involving long bones in the last 5 years. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software.

Results: A total of 500 subjects were screened. Fractures of long bone within past 5 years was seen in 39 percent of the patients. Mean duration of diabetes among patients with and without fracture was 10.3 years and 4.9 years respectively. Significant results were obtained while correlating occurrence of fracture with duration of diabetes. Among patients with history of fractures, mean age was 56.3 years while 62.05 percent of the patients were males.

Conclusion: Diabetic patients are associated with significant quantity of long fractures. The underlying pathogenesis of the higher fracture rate observed in diabetic patients remains ill-defined.

Key words: Bone Fracture, diabetes

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Introduction

Diabetes is an increasingly prevalent disease, with significant associated morbidity and mortality. Type 2 diabetes mellitus (T2DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Long-term hyperglycemia and inadequate glycemic control both contribute to the development of diabetic complications, including nephropathy, retinopathy, neuropathy, and macrovascular diseases such as acute coronary syndrome, claudicatio intermittens, and stroke.[1–3]

Besides micro- or macrovascular long-term complications, T2DM patients also have various skeletal disorders, including osteoporosis and fractures. Diabetes could impact the bone through several mechanisms, some of which may have contradictory effects. The bone turnover and, thus, the skeletal integrity may also be affected by diabetes, and diabetic bone disease can represent an overlooked complication of diabetes. Diabetic osteopathy is characterized by microarchitectural changes that decrease the bone quality and strength, leading to an increased risk of bone fracture in both types of diabetes. Patients with T2DM display a unique skeletal phenotype and impaired structural and geometric properties.[4- 6]Some studies suggested a significant gender difference, with the markedly elevated RR for hip fractures in T1DM present especially in men (17.8 in men and 8.9 in women) and in T2DM only in women. The validity of these observations and their possible explanations (gender differences in body composition or hormonal milieu) need to be further explored.[7, 8] Hence; the

©2020Int. J. LifeSci.Biotechnol.Pharma.Res.

present study was conducted for assessing the Incidence of long bone fractures among diabetic patients.

Materials & methods

The present study was conducted for assessing the incidence of long bone fractures among diabetic patients. A total of 500 patients with type 2 diabetes were screened in the present study. All the patients belonged to the age range of 40 to 80 years. In all the patients, the duration of diabetes was more than 5 years. Complete demographic and clinical details of all the patients was obtained. A Performa was made and complete clinical details of all the patients was recorded separately. All the patients were asked about history of fractures involving long bones in the last 5 years. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software.

Results

A total of 500 subjects were screened. Fractures of long bone within past 5 years was seen in 39 percent of the patients. Mean duration of diabetes among patients with and without fracture was 10.3 years and 4.9 years respectively. Significant results were obtained while correlating occurrence of fracture with duration of diabetes. Among patients with history of fractures, mean age was 56.3 years while 62.05 percent of the patients were males.

Table 1: Incidence of fractures of long bone

Fracture of long bone	Number	Percentage
Present	195	39
Absent	305	61
Total	500	100

Table 2: Correaltion of occurrence of fractures with duration of diabetes

Fracture of long bone	Mean duration of diabetes (years)	p-value
Present	10.3	0.002 (Significant)
Absent	4.9	

Table 3: Demographic data of subjects with occurrence of fractures

Variable	Number	Percentage
Mean age (years)	56.3	
Males	121	62.05
Females	74	37.95

Discussion

Osteoporosis is associated with significant morbidity and mortality, mostly owing to increased risk of fragility fractures (9 million fractures in 2000). Osteoporosis is especially prevalent in postmenopausal women, leading to a very high lifetime risk of hip, vertebral, and wrist fractures, estimated at around 40%. Because age is an independent risk factor for osteoporotic fractures (3), increasing life expectancy in developed countries will dramatically increase the magnitude of the problem in the future.[7]In addition, diabetes mellitus (DM) especially type 2 (T2DM) has reached epidemic proportions: the incidence is continually rising and is currently 4 times more than that recorded a few decades ago. The numerous complications and comorbidities associated with long-standing DM contributes to the huge impact of the disease. With current medical advances, both people with type 1 (T1DM) and people with T2DM have significantly improved survival, and with the prevalence of osteoporosis increasing with age, osteoporosis will become a concern, with an increasingly large population of patients with diabetes.[8-10]

A total of 500 subjects were screened. Fractures of long bone within past 5 years was seen in 39 percent of the patients. Mean duration of diabetes among patients with and without fracture was 10.3 years and 4.9 years respectively. Significant results were obtained while correlating occurrence of fracture with duration of diabetes. Among patients with history of fractures, mean age was 56.3 years while 62.05 percent of the patients were males. Men and women with type 2 diabetes mellitus (T2DM) typically have normal to high BMD compared with their age-matched healthy peers. Several factors likely contribute to this observation. BMD is strongly associated with body weight, and low BMI is as a known risk factor for the development of osteoporosis and fracture. Conversely, persons of higher weights such as those with the T2DM will have higher BMDcompared with age-matched controls. In part, increased BMD in those with T2DM may represent biomechanical adaptation to greater loads placed on the skeleton. Lean mass, often increased in proportion to

©2020Int. J. LifeSci.Biotechnol.Pharma.Res.

weight gain, places biomechanical strain on bone and can potentiate bone formation in T2DM. Insulin is anabolic to bone, and the hyperinsulinemic states associated with T2DM may also promote skeletal acquisition. It should be noted that the finding of increased BMD in men and women with T2DM is in stark contrast to the low BMD of those with type 1 diabetes (T1DM). An autoimmune disease of insulin deficiency, T1DM is often accompanied by nutritional deficits, low body weight and other factors, which cause impaired bone formation and decreased BMD.[11, 12]Strotmeyer ES et aldetermine if type 2 diabetes mellitus or impaired fasting glucose was associated with higher fracture rates in older adults and to evaluate how diabetic individuals with fractures differed from those without fractures. The Health, Aging, and Body Composition Study participants were well-functioning, community-dwelling men and women aged 70 to 79 years (N = 2979; 42% black), of whom 19% had DM and 6% had impaired fasting glucose at baseline. Incident nontraumatic clinical fractures were verified by radiology reports for a mean ± SD of 4.5 ± 1.1 years. Cox proportional hazards regression models determined how DM and impaired fasting glucose affected subsequent risk of fracture.Diabetes mellitus was associated with elevated fracture risk (relative risk, 1.64; 95% confidence interval, 1.07-2.51) after adjustment for a hip bone mineral density (BMD) and fracture risk factors. Impaired fasting glucose was not significantly associated with fractures (relative risk, 1.34; 95% confidence interval, 0.67-2.67). Diabetic participants with fractures had lower hip BMD (0.818 g/cm2 vs 0.967 g/cm2; P<.001) and lean mass (44.3 kg vs 51.7 kg) and were more likely to have reduced peripheral sensation (35% vs 14%), transient ischemic attack/stroke (20% vs 8%), a lower physical performance battery score (5.0 vs 7.0), and falls (37% vs 21%) compared with diabetic participants without fractures (P<.05).These results indicated that older white and black adults with DM are at higher fracture risk compared with nondiabetic adults with a similar BMD since a higher risk of nontraumatic fractures was found after adjustment for hip BMD. Fracture prevention needs to target specific risk factors found in older adults with DM.[13]

Conclusion

Diabetic patients are associated with significant quantity of long fractures. The underlying pathogenesis of the higher fracture rate observed in diabetic patients remains ill-defined.

References

1. Ottenbacher KJ, Ostir GV, Peek MK, Goodwin JS, Markides KS. Diabetes mellitus as a risk factor for hip fracture in Mexican-American older adults. J Gerontol A Biol Sci Med Sci. 2002;57(10):M648–M653.
2. Gerdhem P, Isaksson A, Akesson K, Obrant KJ. Increased bone density and decreased bone turnover, but no evident alteration of fracture susceptibility in elderly women with diabetes mellitus. Osteoporos Int. 2005;16(12):1506–1512.
3. Strotmeyer ES, Cauley JA, Schwartz AV, Nevitt MC, Resnick HE, Bauer DC. Nontraumatic fracture risk with diabetes mellitus and impaired fasting glucose in older white and black adults: the health, aging, and body composition study. Arch Intern Med. 2005;165(14):1612–1617.
4. de Liefde II, van der Klift M, de Laet CE, van Daele PL, Hofman A, Pols HA. Bone mineral density and fracture risk in type-2 diabetes mellitus: the Rotterdam Study. Osteoporos Int. 2005;16(12):1713–1720.
5. Napoli N, Strotmeyer ES, Ensrud KE, et al. Fracture risk in diabetic elderly men: the MrOS study. Diabetologia. 2014;57(10):2057–2065
6. Leslie WD, Morin SN, Lix LM, Majumdar SR. Does diabetes modify the effect of FRAX risk factors for predicting major osteoporotic and hip fracture? Osteoporos Int. 2014;25(12):2817–2824.
7. Schwartz AV, Vittinghoff E, Bauer DC, et al. Association of BMD and FRAX score with risk of fracture in older adults with type 2 diabetes. JAMA. 2011;305:2184–2192.
8. Rauch F. Bone biopsy: indications and methods. Endocr Dev. 2009;16:49–57.
9. Brandi ML. Microarchitecture, the key to bone quality. Rheumatology (Oxford) 2009;48(Suppl 4):iv3–iv8.
10. Dominguez LJ, Barbagallo M. The cardiometabolic syndrome and sarcopenic obesity in older persons. J Cardiometab Syndr. 2007;2:183–189
11. Liu XS, Cohen A, Shane E, et al. Bone density, geometry, microstructure, and stiffness: Relationships between peripheral and central skeletal sites assessed by DXA, HR-pQCT, and cQCT in premenopausal women. J Bone Miner Res. 2010;25:2229–2238.
12. Cohen A, Dempster DW, Muller R, et al. Assessment of trabecular and cortical architecture and mechanical competence of bone by high-resolution peripheral computed tomography: comparison with transiliac bone biopsy. Osteoporos Int. 2010;21:263–273.
13. Strotmeyer ES et al.Nontraumatic Fracture Risk With Diabetes Mellitus and Impaired Fasting Glucose in Older White and Black Adults. Arch Intern Med. 2005;165(14):1612-1617.

©2020Int. J. LifeSci.Biotechnol.Pharma.Res.