

Diabetes Newsletter



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Diabetes and Bone Health

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Osteoporosis is the most common type of bone disorder, affecting an estimated 10 million Americans. It is a chronic condition characterized by reduced bone strength, low bone mass, and a higher risk of bone fracture, especially at the hip, spine, and wrist. If you are over the age of 50, there is a 55% chance that you are at increased risk for osteoporosis or have it already. The risk of osteoporosis increases with age; it is not, however, limited to older individuals.

Osteoporosis can be prevented or slowed down, but once damage to the bone has taken place, it can be difficult to reverse. Bone fractures are the main consequence of osteoporosis, and they are associated with lasting disability after they occur, especially hip fractures in older people.

For reasons that are still unclear, people with both Type 1 and Type 2 diabetes experience a higher incidence of bone fracture than the general population, even though people with Type 2 diabetes tend to have above-average bone density. It is especially important, then, for people with diabetes to know about osteoporosis, to have their risk of fracture evaluated by medical professionals, and to find out what they can do to make their bones as strong and healthy as possible.

Bone mineral density

One way health-care providers evaluate a person's risk of osteoporosis is to do a bone mineral density (BMD) test. The most common test uses x-ray beams, is painless, and can be done in a matter of minutes.

BMD is a core indicator of bone strength. A test for BMD measures the amount of a mineral, usually calcium, in a bone. This measurement is then compared to the pooled measurements of a group of healthy young adults using a statistical indicator called a *standard deviation*. If the BMD of the person being evaluated is 2.5 standard deviations or more below the average reference-group BMD, that person is considered to have osteoporosis. If BMD is 1—2.5 standard deviations below the reference-group average, it indicates a less severe condition called *osteopenia*, or low bone mass. Lower BMD usually means that the bone is weaker. In general, people with Type 1 diabetes have lower BMD and people with Type 2 diabetes have higher BMD than people without diabetes with otherwise similar characteristics.

Several studies have been conducted to determine whether diabetes affects bone mineral density. However, most studies have used readings taken at only one point in time, so little is actually known about changes in BMD that occur because of diabetes. Studies that track individuals over a long period will be needed to fully understand how diabetes affects BMD. The existing studies on diabetes and bone health, however, have produced some important findings.

Fracture risk studies

Two recent comprehensive meta-analyses found that people with Type 1 diabetes had a risk of hip fracture 6.3–6.9 times as high as people without diabetes; people with Type 2 diabetes had a risk 1.4–1.7 times as high. (A meta-analysis is a statistical way to combine the results of many studies that ad-

dress similar questions. It is helpful in this case to get the most accurate estimate of fracture risk.) While the increased risk accompanying Type 2 diabetes may be small, it represents a risk associated only with diabetes, not with sex, age, physical activity level, or body-mass index. The small number of studies on Type 1 diabetes and fracture made it impossible to rule out other fracture risk factors such as sex, age, physical activity, and body-mass index. Although there were not enough data on diabetic complications to thoroughly evaluate their impact, individuals with more complications were generally found to have a higher fracture risk. An important finding from several recent studies was that an increased risk of fracture was present among people with both Type 1 and Type 2 diabetes at middle age, not just among older individuals.

Much attention has focused recently on the fracture risk associated with the diabetes drug rosiglitazone (brand name Avandia). In the study known as A Diabetes Outcome Progression Trial (ADOPT), women with Type 2 diabetes who were randomly assigned to take rosiglitazone, rather than metformin or glyburide (two other diabetes drugs) had approximately twice the incidence of bone fracture. Based on warnings issued by their manufacturers, the Food and Drug Administration issued a Safety Alert in March 2007 stating that rosiglitazone and pioglitazone (Actos), a drug in same drug class as rosiglitazone, may be related to higher fracture rates in women. (Pioglitazone and rosiglitazone are in a class of drugs called the thiazolidinediones.)

While these findings are important, many studies showing a higher fracture risk in people with Type 2 diabetes were done before thiazolidinediones were available. Therefore, there must be other factors associated with Type 2 diabetes that increase the risk of fracture. Future research must determine the reasons for this increased fracture risk, as well as how to reduce it beyond avoiding medicines that may increase it even further.

Type 1 diabetes and bone mineral density

In one of the meta-analyses mentioned earlier, older age and longer duration of diabetes were found to correspond with lower BMD in the spine, though not in the hip, of people with Type 1 diabetes. Although no relationship was found between BMD and either body-mass index or HbA1c level (an indicator of blood glucose control), older age and longer diabetes duration often signify greater diabetic complications, which could be responsible for the result. Lower BMD in people with Type 1 diabetes does not completely explain the higher fracture risk that has been observed.

Type 2 diabetes and bone mineral density

Higher BMD in people with Type 2 diabetes, as stated earlier, does not protect against a higher fracture risk. One possible explanation for the higher BMD associated with Type 2 diabetes is simply that people with Type 2 diabetes tend to have a higher body weight and therefore a greater load on the skeleton. (In other words, carrying more body weight turns almost any activity into weight-bearing exercise, which is known to preserve bone density.) In one meta-analysis, a higher body-mass index in people with Type 2 diabetes was associated with higher BMD in both the hip and spine, while longer diabetes duration was associated with lower hip BMD. Again, longer diabetes duration may simply signify that a person has more diabetic complications. No relationship was found between BMD and either age or HbA1c level in people with Type 2 diabetes. Few studies exist on BMD changes over time for either Type 1 or Type 2 diabetes. The available data demonstrate, however, that older white women with Type 2 diabetes have more rapid bone loss than those without diabetes. No such difference has been found in white men, black men, or black women. In one study, women with Type 2 diabetes showed greater loss of BMD for each year they took a thiazolidinedione drug, even when other factors that may affect bone loss were taken into consideration. No such effect was found in men. Another study of just men with Type 2 diabetes did find that those taking rosiglitazone lost more BMD than those not taking the drug, but this study did not take into account other factors that could affect bone loss, as the previous study did.

Unlike the study of rosiglitazone that led to new FDA warnings, both of these studies were observational, rather than being randomized clinical trials. Only a randomized trial (in which participants are randomly assigned to one of the treatments being compared) can eliminate the influence of factors that might make a person more likely to receive one treatment over another in a real-world situation. Since people who take thiazolidinedione drugs may tend to be different in unknown ways from those who do not, an observational study

cannot determine the effect of these drugs on BMD with any statistical certainty.

The role of diabetes

Numerous explanations have been suggested for the effect of diabetes on BMD and risk of fracture, but so far, most are not backed up by conclusive research. They include hormonal factors such as higher insulin levels, diabetic complications, and a higher rate of falls. In most studies of both Type 1 and Type 2 diabetes, level of blood glucose control has not been associated with BMD or risk of fracture, but more research is needed to confirm this finding.

One possibility currently under investigation is whether advanced glycation end-products (AGEs), substances that are formed when glucose reacts with proteins inside a cell, accumulate in bone tissue and weaken it. New evidence is also emerging that connects BMD to some conditions that commonly arise from diabetic complications: Very recent studies suggest that reductions in nerve, kidney, and cardiovascular function are related to lower BMD, bone loss, and fracture among older adults, whether or not they have diabetes. Furthermore, several studies of people with Type 1 diabetes have demonstrated that lower BMD is associated with neuropathy (nerve damage), retinopathy (an eye disease), and nephropathy (diabetic kidney disease). More research on diabetic complications is needed to better understand their impact on BMD and fracture risk.

Ensuring bone health

It is critical for people at high risk for osteoporosis to get screened for it so that fractures can be prevented. The major factors that increase the risk of osteoporosis are the following:

- Older age
- Female sex (especially at the time of or after menopause)
- History of fractures as an adult
- History of osteoporosis or fractures in a parent or sibling
- Low body weight (less than about 127 pounds)
- Smoking

Additional factors that may increase the risk of osteoporosis include the following:

- Low calcium or [vitamin D](#) intake, especially lifelong
- High alcohol intake (more than two drinks per day)
- Lack of [exercise](#)
- Estrogen deficiency in women, especially at an early age
- Some medicines for [thyroid conditions](#)
- Use of corticosteroids or immunosuppressive drugs (for asthma, arthritis, cancer, or transplant surgery)
- A variety of other medical conditions including chronic intestinal disorders, nutritional disorders, endocrine disorders, [stroke](#), [kidney failure](#), and organ transplantation

If any of these factors apply to you, you may want to discuss having a bone density test with your health-care provider. In general, the more of these factors you have, the greater your risk of osteoporosis and fracture. Several steps can be taken to prevent or treat low BMD. These include eating calcium-rich foods or taking calcium supplements (1,000—1,500 milligrams per day), ensuring adequate vitamin D intake (400—1,000 IU per day), not smoking, not consuming alcohol in excess, and exercising regularly (especially weight-bearing activities such as walking, jogging, stair climbing, and weight training). If you choose to take calcium supplements, take no more than 500 milligrams at a time because your body can't absorb more than that at once. If you already have osteoporosis, you may want to discuss the variety of drug treatment options available with your doctor.

If you are diagnosed with osteoporosis, it is important to take steps to prevent fractures. However, not all people with low BMD will break a bone, and some people with high BMD will break one. No official recommendation currently exists for fracture prevention that is specific to people with diabetes, since further research is needed to more fully understand how diabetes and fractures are related. However, adults with diabetes may want to observe general fall-prevention measures, which include wearing rubber-soled shoes both indoors and outdoors to prevent slipping, keeping all walkways clear of tripping hazards, maintaining adequate lighting in and around the house, having a grab bar installed in your shower or bath, and placing a rubber mat in the shower or bath. Having your vision and hearing checked regularly, and correcting any problems (with glasses

or a hearing aid, if necessary), can also help prevent falls.

Some medicines could make a fall more likely. These include some sedatives and sleeping pills, antidepressants, anticonvulsants, muscle relaxants, blood-pressure-lowering drugs, and medicines for heart conditions. For unknown reasons, taking four or more prescription drugs, regardless of what they are, has also been shown to increase the risk of falls. If the drugs you take fit into any of these categories or you take four or more drugs, you should go over all of your medicines with your doctor and discuss whether there are other treatment options that are less likely to raise your risk of falling.

While not all factors that contribute to osteoporosis are preventable, bone deterioration and fracture are not inevitable. People with a higher risk of bone loss, including those with diabetes, can and should take steps to strengthen and protect their bones.

Clinton Support Group

TOPIC

Eating for the Holidays

DATE

Thursday,
November 12, 2009

TIME

10:30—11:30 a.m.

PLACE

GVMH Medical Plaza Classroom

Presented By:

Sherry Collins, MS, RD, LD

Bring a favorite holiday recipe and we will look at it and make it healthier.

Warsaw Support Group

TOPIC

Holiday Treats

DATE

Tuesday,
November 10, 2009

TIME

11:30 am—12:30 p.m.

PLACE

Warsaw GVMH Medical Clinic Wellness Center

Presented By:

Jamie Ketterman, RN, BSN, CDE

We will be making some healthy holiday snacks.

Happy Thanksgiving

