



Bone Health and the Gut

SURVEY RESULTS

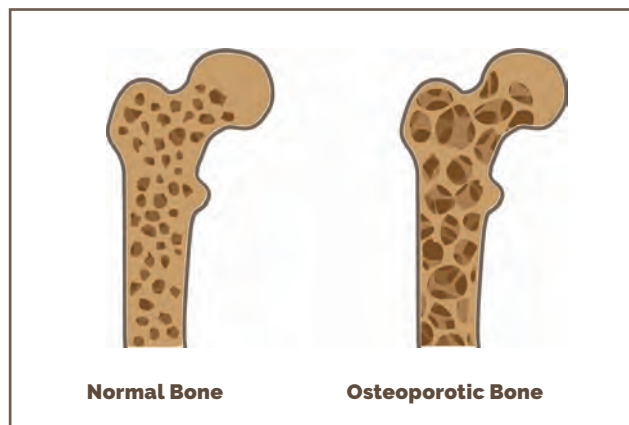
Background

Bone is living tissue. Our bodies continually remove or resorb old bone and form new bone. Strong bone is a result of both the density and quality of bone. Healthy bone development involves the intake of nutrients, such as calcium, vitamin D, and phosphorus, along with mechanical force via weight-bearing exercise.¹

Osteoporosis is a bone disease characterized by low bone density and the deterioration of bone quality, which can lead to an increase in a type of broken bones known as fragility fractures, the consequences of which can be devastating.

Ensuring good bone health in your youth is important, as you are at a higher risk of fractures in your later years if you do not.¹ There are many reasons why people lose bone and develop osteoporosis, including genetic inheritance, physical inactivity, poor diet, excessive alcohol intake, and smoking.

Certain diseases and medications can also cause bone loss.² Gastrointestinal (GI) diseases and disorders are a common factor in developing osteoporosis because they can result in malabsorption and/or maldigestion of the nutrients necessary for bone health and maintenance.³ In other cases, GI conditions cause an individual to avoid foods that contain these vital nutrients. Medication use, such as glucocorticoids, can also increase the probability of low bone density, osteoporosis, and future fractures.¹



Method

The GI Society conducted an online survey to identify the occurrence of bone health issues among those with GI diseases and disorders. It was open internationally from April 30, 2021 to June 19, 2021, for individuals 18 years of age or older who had at least one digestive disease or disorder.

Results

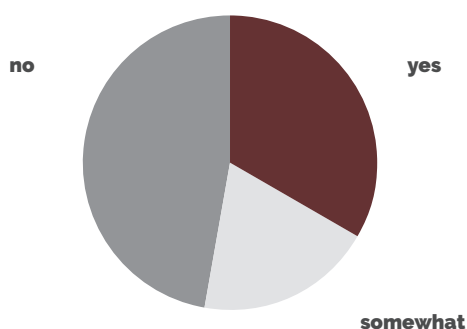
Demographics

A total of 1,008 individuals participated, 91% of whom were female. The largest age cohort was 65-74 years of age (43%), followed by 55-64 (25%), 75-84 (20%), 54 and under (9%), and 85 and older (3%). Although this survey was open to all countries, most were from Canada (91%), followed by the United States (5%), the United Kingdom (1%), and Australia (0.5%), with a few respondents from other countries.

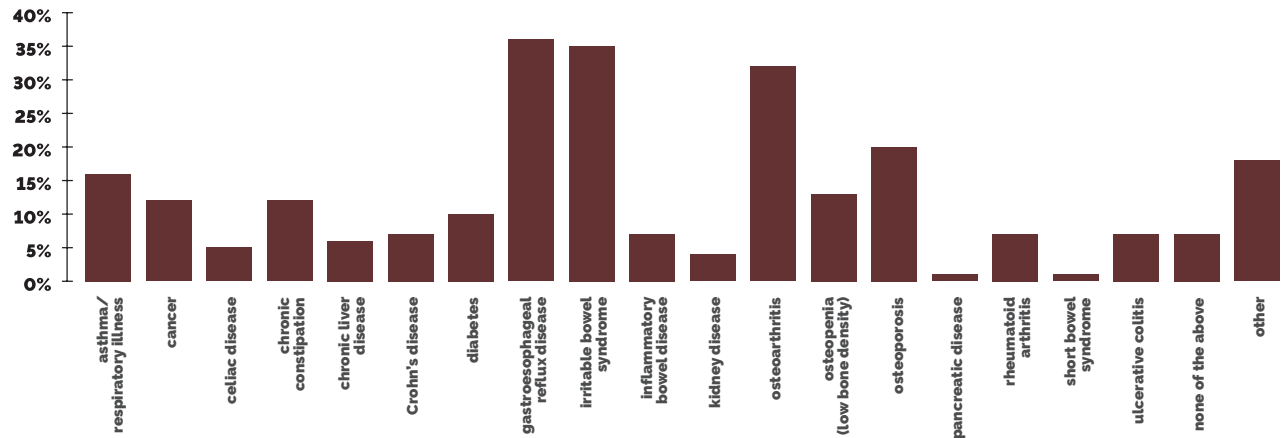
Diseases and Conditions

Our survey offered a list of specific conditions that might increase the risk of a fragility fracture, either from the disease itself or medications used to treat it, along with an option to write in additional responses. We asked respondents to check all conditions for which they had a diagnosis. The two most prevalent disorders identified were gastroesophageal reflux disease (GERD) at 36% and irritable

Are you aware that persons with chronic inflammatory diseases are often at increased risk of a future fracture?



Have you been diagnosed with any of these conditions (check all that apply)



bowel syndrome (IBS) at 35%. While malabsorption is not a concern in IBS, many with this condition avoid foods that exacerbate symptoms, which could include limiting dairy products that are high in calcium, or other restrictive diets that might be harmful.⁴ Also, a common treatment for GERD is proton pump inhibitors, which might increase the risk of bone fractures.¹ In our survey, 68% of those with GERD were currently taking a proton pump inhibitor and 16% had taken them previously.

There were 18% of respondents who had a form of inflammatory bowel disease (IBD), including Crohn's disease, ulcerative colitis, and microscopic colitis. Research shows that the incidence of fracture among persons with IBD is 1.4 times greater than that of the general population.⁵ If these diseases are not well controlled, then they can cause malabsorption and maldigestion of the essential nutrients needed to build strong bones.

Close to 5% of respondents reported a diagnosis of celiac disease. Studies show that a fragility fracture is almost twice as common in individuals clinically diagnosed with celiac disease, as in those without the disease.⁶ Fortunately, while adhering to a strict gluten-free diet, absorption of

nutrients will improve, and their risk of fracture could decrease by up to 50%.⁷

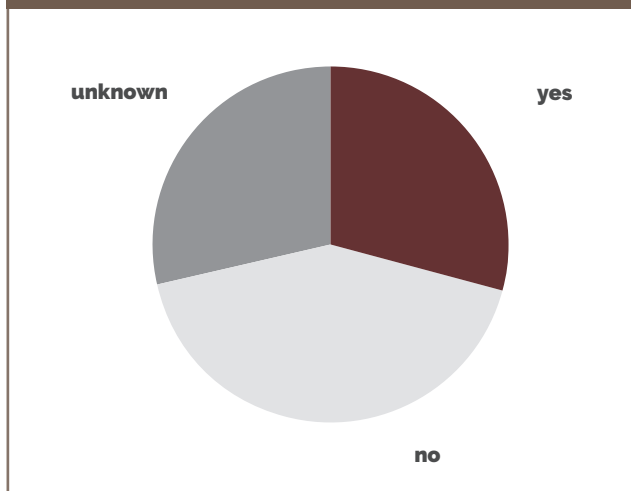
We found that 13% of respondents had a diagnosis of osteopenia (low bone density) and 20% of osteoporosis. These individuals are at an increased probability of future fracture. Research also shows that adherence to osteoporosis treatment guidelines is typically poor.⁸

To lessen any confusion between bone disease and joint disease, we included osteoarthritis (painful, swollen joints), which is common in those 65 years of age and older. Given that 66% of our respondents are in this age category, it was not surprising to find 32% of the survey respondents also had an osteoarthritis diagnosis. This could be related to decreased mechanical force on the bone, due to immobility from pain, which may increase the probability of weaker bones, poor balance, falls, and lead to low trauma fracture.

While glucocorticoid medications play a key role in the treatment and management of inflammatory conditions such as asthma, rheumatoid arthritis, and inflammatory bowel disease, prolonged use can lead to bone loss and fractures.⁹



Has your biological mother, father, or grandparent been diagnosed with osteoporosis?



Although 73% of our respondents have never taken a glucocorticoid, the 6% of respondents who have taken a dose of 7.6 mg or greater daily, for three consecutive months or longer, are at greater risk of fracture.

Predicting Fracture Risk

As we age, we are more susceptible to osteoporosis and fracture, with the spine being the most vulnerable skeletal site for a fragility fracture or collapse, noticed as stooped posture or height loss.¹⁰

Your family history can often reveal your fracture risk probability due to genetic inheritance. In our survey, 29% had parents and/or grandparents diagnosed with osteoporosis. In addition, 34% had parents and/or grandparents with stooped or hunched posture and 27% of survey respondents have lost at least 6 cm (2.5") since their tallest height, which are factors that indicate possible spinal collapse or vertebral fractures.

Research shows that the best predictor of a future fracture is a previous fracture,¹¹ even though most fragility fractures are preventable through appropriate osteoporosis assessment, education, treatment, and follow-up. Of the 23% respondents who broke a bone since

age 45, some with multiple fractures, 41% indicated wrist/forearm fractures, followed by 11% with spinal fractures, and 7% with hip/pelvis fractures.

Supplements and Lifestyle

To ensure good bone health, Health Canada recommends¹² that children 9-18 years of age consume 1,300 mg total of dietary and elemental calcium, adults 19-50 and men 51-70 consume 1,000 mg, and women 51-70 and all adults older than 70 consume 1,200 mg. They also recommend that children and adults from 9-70 years of age consume 600 IU of vitamin D daily.

Your childhood diet during the time your bones are forming lays the foundation for lifelong bone health. Fortunately, 68% of respondents consumed dairy products as a child. However, the 20% who rarely and the 9% who never consumed these products might be at an increased risk of lower peak bone mass and future fracture, unless they consumed sufficient calcium from non-dairy sources.¹³

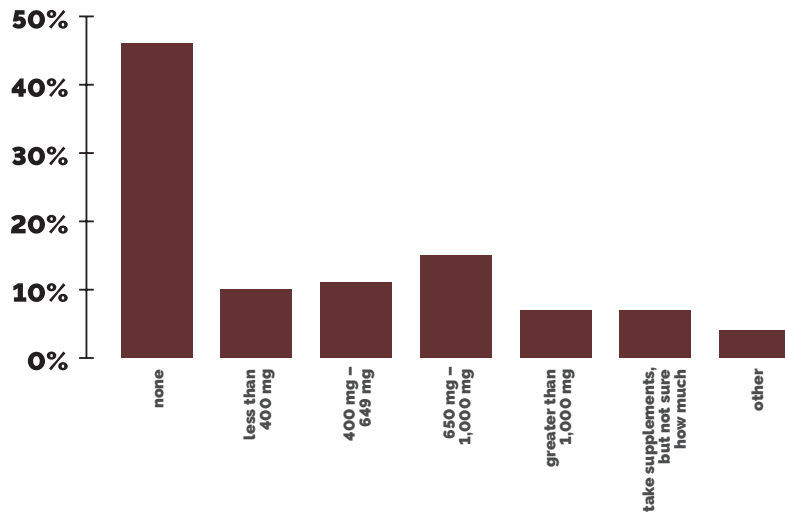
Remarkably, 29% of respondents currently have an eating restriction that would limit their intake of foods high in calcium.

Vitamin D is essential in calcium and phosphorus metabolism and for normal development of bones and teeth. Few foods naturally contain vitamin D or fortification with it. Health Canada recommends that adults over 50 years of age take 400 IU supplementation per day, depending on their health status.¹² Of our respondents, 23% supplement with less than 400 IU of vitamin D per day, 13% supplement with 400-999 IU per day of vitamin D, and 44% take 1,000-2,999 IU per day. Surprisingly, 13% supplement with $\geq 3,000$ IU per day, a level which you should only consume under medical supervision. Most multivitamins contain some calcium and vitamin D and 30% of respondents indicated they were taking one multivitamin at least daily, 13% occasionally, and 52% were not taking one at all.

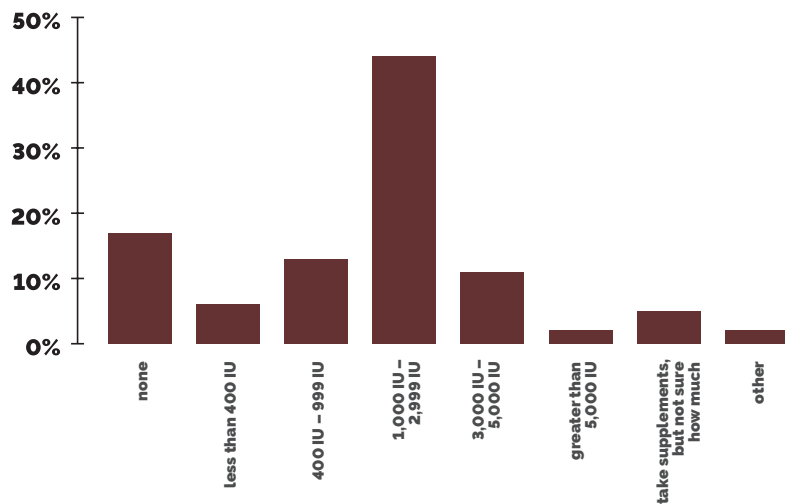
Strong bones develop with weight-bearing and resistance exercises. While encouraging appropriate exercise based on your age and health status, national guidelines recommend adults accumulate at least 150 minutes of moderate to vigorous physical activity per week.^{14,15} When asked



How much calcium do you take per day in supplement form?



How much vitamin D?



how frequently they exercise for at least 30 minutes, 53% indicated 3-5 times per week, while 11% fell a little short at 1-2 times per week. Of concern are the 34% who responded occasionally or rarely.

When asked which specific types of activities their exercise regimen included, 22% incorporate resistance/strengthening (weight-bearing) exercises, 36% stretching, 15% aerobics, 12% yoga, and 2% tai-chi. Interestingly, 39% wrote in other exercises and, of these, 70% mentioned walking. Walking is a good weight-bearing exercise. The benefit increases if the walk is brisk and even more so if it includes a few jolts or jumps to stimulate the bone strengthening process.

We asked how frequently our respondents do weight-bearing activities to capture those such as jogging, hiking, and walking. We found that 54% meet the recommendation of at least 3-5 times per week, yet 27% fall into the category of occasionally or rarely.

Fortunately, smoking tobacco, a risk factor for osteoporosis, is not an issue for 92% of our respondents.

Communication and Information Sources

Even with a good intake of nutrients, other factors influence nutrient absorption for GI patients, such as disease flares in inflammatory bowel disease¹⁶ and non-adherence to a gluten-free diet in celiac disease.

Given the importance of optimal nutrient absorption to bone health, it is of concern that 43% of our respondents were either only somewhat aware or not aware that malabsorption of calcium and vitamin D increases the risk of a



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future fracture.

Also of concern, but less surprising, is that 66% were somewhat aware or not aware that chronic inflammatory disease often increases the risk of a future fracture. Knowledge of the disease process may influence a person’s decision-making about medications and their adherence to a treatment regimen.^{17,18}

On average, 33% of our respondents communicate with healthcare professionals about disease severity, medication benefits, medication side effects, and how the disease affects their day-to-day life, 21% also ask about supplements, 17% enquire about daily nutritional intake, and 15% about alternative medicines and exercise. Interestingly, 33% of respondents do not talk about any of these issues with healthcare professionals.

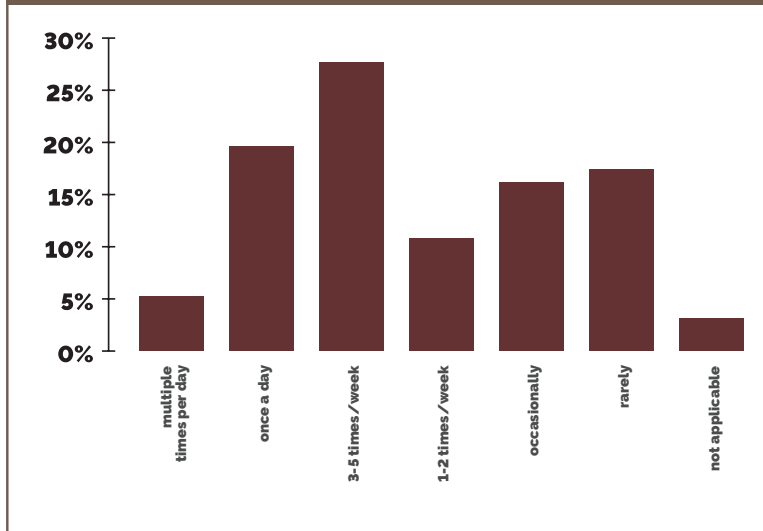
As trusted sources for nutritional advice, 39% of respondents indicated family physicians, but the internet at 36% was very close behind. Only 21% indicated dietitians, with family and friends at 18%, medical specialist at 17%, and pharmacist at 15%. Interestingly, naturopath was 12%, leaving nurses at 5% and nurse practitioners at 3%.

Finally, when asked how likely it would be that they ask their doctor about nutrition and digestive health, 31% said likely or very likely, 46% said unlikely or very unlikely, and the remainder said neither likely nor unlikely or not applicable.

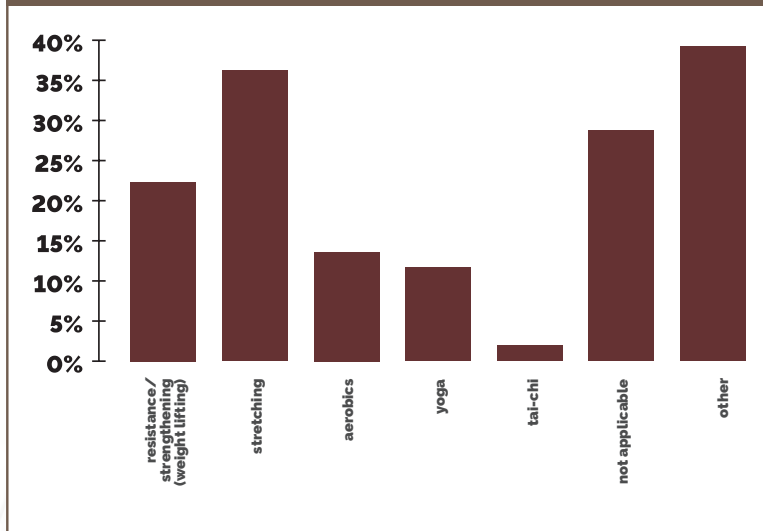
Conclusion

A variety of factors influence the connection between bone health and gastrointestinal conditions, including malabsorption, food avoidance, and medications. Sun exposure precautions (e.g., sunscreen, staying indoors when it is sunny), while good for your skin, might also limit vitamin D absorption. In addition, many individuals seem to be lacking in clear direction as to which exercise type and intensity is best for their age and health status.

On average, how frequently do you exercise for at least 30 minutes?



Does your exercise program include (check all that apply):



Fragility fractures can significantly affect your quality of life, as well as your independence and self esteem, and can increase burdens on our healthcare system.¹⁹ Through education and increased awareness, we can predict and prevent devastating fragility fractures for people living with gastrointestinal diseases and disorders.

Note: We have rounded all percentages to the nearest whole number.

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Please Note

The Gastrointestinal Society does not intend that this report replace the knowledge or diagnosis of your physician or healthcare team, and we recommend seeking advice from a medical professional whenever a health problem arises.

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