

Celiac Disease with Osteoporosis

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Abstract

Celiac Disease, an autoimmune disorder that is triggered by gluten in the diet, can impact an individual's bone health. One common problem is that many people are unaware they have Celiac Disease which can lead to even more, unnecessary health issues. As a result of this autoimmune disease, following a gluten free diet is the most helpful for an individual to regain their body's health. This means there are no traces of wheat, barley, oats, rye, or malt in anything consumed of the individual. If the patient has Celiac Disease and is not treating it, this leads to malnutrition because they are not able to absorb the nutrients needed in the body. Therefore, bone health is reflected because many nutrients such as calcium and vitamin D are necessary for bones to grow. The lifestyle of any Celiac patient changes tremendously and starts by a diet change to heal their gut.

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Introduction

Celiac Disease is an autoimmune disease that is triggered by gluten in the diet. It leads to many nutrient deficiencies because of the villous damage in the small intestine which means the body will not absorb the necessary nutrients. “The frequency of Celiac Disease is increasing in many developing countries because of westernization of the diet, changes in wheat production and preparation, increased awareness of the disease, or a combination of these factors” (Fasano, A. 2012). Celiac Disease is most commonly cured by following the gluten free diet, as this allows your body to break down and absorb the proper vitamins and nutrients your body needs to survive. Someone with Celiac Disease will have a harder time meeting their nutrients because they cannot eat certain things, which can lead to other health problems to develop in the body. This is why it is important to diagnose Celiac Disease early and modify your diet based on this.

The development of osteoporosis has been linked to asymptomatic Celiac Disease through much research and testing. Osteoporosis occurs when bones are not as dense as they are supposed to be which can cause immense bone fractures and bone breakages. This happens when an individual doesn't modify to a gluten free diet, leading to a malabsorption of calcium and vitamin D, which are critical nutrients to sustain bone health and prevent osteoporosis. Because of this, it is very important to get annual checkups and take precaution if something is particularly out of the normal range for bloodwork. The most common irregularities in blood work would include the deficiencies of iron, calcium, vitamin D, and other significant nutrients to maintain a healthy gut. Individuals who are unaware that they may have Celiac Disease don't control their diet consumption, which can result in the development of osteoporosis long-term.

Summary of Literature

Asymptomatic vs. Symptomatic

Over time doctors have been able to distinguish osteoporosis as being a “relatively frequent atypical presentation of CD” in adults. Osteoporosis related bone fractures and being increasingly linked to undiagnosed Celiac Disease are also linked to asymptomatic Celiac Disease symptoms (Bianchi, M., & Bardella, M. T., 2008). Being asymptomatic is when the individual is showing no symptoms, therefore there are harmful side effects for when this happens. As a result, people are not aware of their issue until another problem can occur. Since no symptoms do appear on the outside for individuals, Celiac, which is a very common atypical disease, is difficult to accept having. This is a major problem because as identified patients with unaware Celiac Disease and many other autoimmune diseases have shown to have serious intestinal damage even present with no symptoms. This is also known as silent Celiac Disease (Bianchi, M., & Bardella, M. T., 2008). Atypical forms are very dangerous. They are detected primarily by diagnostic exams but even these can take years for individuals to agree with getting. Therefore, it can take years or decades for this autoimmune disease to go unrecognized (Bianchi, M., & Bardella, M. T., 2008). “Parts of the immune system called antibodies can help with diagnosing autoimmune disorders. The most frequent blood test used looks for something called IgA antibodies. Unfortunately this test isn’t always perfect. So if Celiac Disease is still suspected despite a negative test, there are other parts of the immune system that can be tested. While these blood tests are often positive in people with celiac disease, they can also still be negative - especially if you've been following a strict gluten-free diet.” (CONNOLLY, K. M, 2019). As there is also an increasing link between osteoporosis and Celiac Disease, doctors have begun creating more intense testing procedures for Celiac, focusing on the different ways in which the

disease can be presented in people's bodies (Bianchi, M., & Bardella, M. T., 2008). This can come in different, non-classical forms, including osteoporosis.

Being asymptomatic to Celiac Disease is much worse than being symptomatic. This is because it is harder to be aware of the disease if there are no symptoms shown on an individual. Following a gluten free diet cures Celiac Disease patients because it is a change of lifestyle for a healthier gut. In a study testing gluten exposure to those with Celiac Disease, there are 29% patients that reported they experience fewer symptoms and 34% patients experience more symptoms with gluten exposure. In addition over 40% of patients reported their symptoms increased in intensity (Silvester, J. A., 2016). Celiac patients are more common to have symptoms that will get harsher as time goes on. This is why it is not something one can ignore because it will then lead to other health issues. Without a gluten free diet the body is not able to absorb nutrients. An example of symptoms that can occur when there is an initial diagnosis include, fatigue and irritability, headaches, and diarrhoea is the most common gastrointestinal symptom, however individuals exposed to gluten experience constipation (Silvester, J. A., 2016). Symptomatic Celiac Disease is only cured with a gluten free diet, however asymptomatic Celiac Disease takes more time to identify and cure because it can be unknown to the individual for years.

Treatment of Celiac disease

The best way to treat Celiac Disease is to follow a gluten free diet. This mainly means avoiding certain foods such as rye, barely, wheat, flour, oats (depending on how they are processed), and malt. The villi in the intestines will be flat and not absorb any nutrients as a result of eating these foods. Therefore, the gluten free diet will help the intestine build up and get back to normalization. It is difficult for many to recognize what has gluten in it because there are

secret ingredients in some foods that people do not know of. For instance, soy sauce has wheat in it to thicken the sauce. Also some chocolate bars such as a milky way have malt in the ingredients. Many people are not aware of the ingredients in what they are eating, therefore it can be difficult to maintain this type of diet. No matter the age group, a gluten free diet is the only treatment for Celiac Disease. It is recognized that those who develop the disease earlier in life are actually able to reboot themselves for the better. However, the older the individual, the harder it is to switch their lifestyle so quickly. “When a diagnosis of CD is made in an adult, GFD is still considered the most rational treatment approach, even if by itself it cannot always correct the bone alterations” (Bianchi, M., & Bardella, M. T., 2008). Everyone’s bones are developed throughout an individual’s whole life, so even though it is most important for younger individuals to strictly adhere to this diet, it is still very significant to change to a gluten free diet whenever diagnosed with Celiac Disease.

A gluten free diet can impact your lifestyle tremendously, especially for those who don’t find out about it until later on in life. It has been found that when a diagnosis of Celiac Disease is made in children, “a GFD is considered the sole therapy. If strictly followed for the rest of life, it is effective in resolving the intestinal inflammatory processes and can also make the recovery of a normal bone density possible” (Bianchi, M., & Bardella, M. T., 2008). Considering I was five years old when I was diagnosed, I do not remember what most “regular food” tastes like today. This was an advantage for me because I did not know what I was missing out on. Although it was easier not knowing how good the brownie was my friend was devouring, I still found a gluten free diet manageable.

Supplements for nutrients

There are a lot of arguments for taking supplements to help maintain a healthy lifestyle. In recent studies, Celiac Disease was looked at further in relation to bone health, and it was found that supplements often help ensure that calcium, vitamin D and iron are being properly taken in by individuals with Celiac Disease. Additionally, “since intestinal damage (called atrophy) is so common in Celiac patients, the process of absorption of nutrients, and especially folate, is severely impaired. Second, the pH of the stomach affects folic acid absorption. The higher the pH, the lower the absorption of folic acid, which is the case in celiac patients”(Expert, P., 2018). At The Institute of Medicine, it is recommended that an individual has a daily calcium intake of 1,000 mg for men and women up to age 50. Women over age 50 and men over age 70 should increase their intake to 1,200 mg daily (National Resource Center, N., 2018). Without Vitamin D in an individual’s body, it is difficult to have healthy and sturdy bones. This is why it plays an important role in calcium absorption and bone health. For example some food sources of vitamin D include egg yolks, saltwater fish, and liver. The patients who are older and live in colder climates using sunscreen are the most likely individuals to be deficient in this vitamin. This is when supplement forms of vitamin D are important and necessary to take to achieve the recommended intake per individual (National Resource Center, N., 2018). Another important nutrient that is low in Celiac patients is iron. This was actually how I found out I had Celiac Disease. I personally was very deficient in this nutrient which led me to be anemic and feel fatigue frequently. Overtime following a gluten free diet worked to fix my iron levels and other nutrients. In a study of 132 Italian adult patients with Celiac Disease, anemia was 34% of the patients symptoms. After following a gluten free diet for these patients, their iron deficiency was

completely corrected or improved (Stefanelli G., 2020). It is very important to include supplements and a healthy diet according to an individual's health categories.

Barriers of Celiac Disease

There are various barriers that can come along with building intestinal and immune health. Right off the bat, there are many products which contain gluten that people do not even know of or suspect. Oftentimes, particularly in countries outside the United States such as India and China, food labels contain very minimal information and often lack any gluten free indication on the packaging. "Patients with Celiac Disease are challenged with barriers in maintenance of a strict GFD because of factors such as inadequate information and education about the disease, food contamination, and inadequate/no food labeling on the packaged food items" (Rajpoot, P., & Makharia, G. K., 2013). The individuals outside of the United States have minimum access to gluten free products. Additionally, gluten can be found in certain products that individuals would never even think so associate with gluten, such as lipstick, postage stamps and certain malt beverages. Another barrier which exists is the issue of food contamination. Restaurants that are not 100% gluten free can cause cross contamination in their gluten free food items without intending to. If a piece of fruit that is considered gluten free is now on the same surface that a slice of pizza was just on, this can cause cross contamination and have Celiac Disease patients in harm's way. There can also be the use of the same utensils, which could make the gluten free product not gluten free anymore. This can also happen in food mills before the food is even packaged if the machines aren't cleaned properly or if the same production line is used for glutinous and gluten free products. Additionally, gluten free food items are considerably more expensive than regular, mass-produced products that contain gluten. Oftentimes at restaurants it costs more money to prepare gluten free food, and products at the supermarket are

clearly priced differently. The price of gluten free products are based on supply and demand.

With not only a little percentage of the world having Celiac Disease, this can result in the products being more pricey. Because of this, patients with Celiac Disease need to dedicate more of their budget to their daily food habits, and take it away from other areas of their life.

“Availability of GF foods is a factor which determines compliance to GFD. Furthermore, difficulty in obtaining GF food interrupts compliance to GFD. Even in countries where Celiac Disease is common, 10%–15% patients report difficulty in getting a continuous supply of GF food. Non-availability of GFD outside their home environment restricts their travel, occupation and profession” (Rajpoot, P., & Makharia, G. K., 2013).

There are numerous recommendations which doctors make when a patient is diagnosed with Celiac Disease, the most common being nutrition counseling to learn about what gluten free means, how to maximize your diet and still be satisfied, as well as the potential effects or threats of not following a gluten free diet. Additionally, there are Celiac Disease support groups which allow patients to discuss their knowledge and to encourage groups to advocate and lobby for the requirement of gluten labeling on all packaging by the FDA. As a result of being diagnosed with Celiac disease, many feel that the “successful management of Celiac Disease requires a team approach, including patient, family, physicians, and dietitian. After a diagnosis is made, all the patients should be referred to a dietician for nutritional assessment, diet education, meal planning, and assistance with the social and emotional adaptation to the GF lifestyle” (Rajpoot, P., & Makharia, G. K., 2013). You have to be conscientious 24/7 when following a gluten free diet.

What happens to patients who don't follow a gluten free diet?

Patients who chose to not follow a gluten free diet when diagnosed with Celiac Disease are actually doing much more harm to themselves than they believe. This is why so many other health issues come about because they are not allowing their body to absorb nutrients they need to be healthy and function well. Based on the RDI of calcium, vitamin D, and other bone metabolized vitamins and minerals, the absorption of nutrients is critical to the patient. If the individual is restricting foods, they will not be able to have a well balanced diet to fulfill the nutrients necessary for survival. It is common to not know you have this disease, as nearly 83% of people with Celiac Disease don't know they have it (Todd, K. n.d.). However, that doesn't mean that it is something you should ignore throughout your whole life. Anyone can develop Celiac Disease at almost any time in their life, and if you are not careful it can be extremely detrimental to your health. It is unfortunate if you have not been diagnosed because then you don't follow the gluten free diet which is actually hurting you more. This can also lead to more disorders and other widespread issues. One of the most common outcomes of not following a gluten free diet is the development of IBD, known as irritable bowel disease. IBD is very popular for Celiac Disease patients to be diagnosed with because it is also an intestinal problem. Many clinicians of Celiac Disease are aware of the severe intestinal damage that can be done to those who are not following a gluten free diet. From the past, Celiac Disease was recognized most by symptoms such as malabsorptions and steatorrhea. (Bianchi M. L., 2010). Malabsorption and inflammation are casual factors of bone loss due to IBD and Celiac Disease (Bianchi, M. L. 2010). It is important that individuals who are at risk of developing Celiac Disease understand the relationship of Celiac Disease and other common issues that can come along based on their diet. For instance, there are studies that identify other health problems to occur such as 35% of

people who are affected by Celiac Disease and IBD are more likely to develop osteoporosis (Bianchi, M. L. 2010). Osteoporosis puts an individual's bone health at risk.

My impact from my life of being diagnosed with Celiac Disease

When I was five years old I was diagnosed with Celiac Disease. This autoimmune disorder has definitely impacted the way my life is today. Being just a child and finding out my diagnosis, I had lots of favorite foods that I needed to change to be able to follow a gluten free diet. I knew the gluten free diet would be my only cure and that it was the only way I would start to feel better and fuel my body correctly to start to absorb nutrients that I needed to help me grow. My Celiac Disease diagnosis has actually encouraged me to exercise and eat healthier to build strong bones. I know at first a Celiac diagnosis can be scary but taking steps by following a gluten free diet and introducing a healthy lifestyle will result in absorbing nutrients and healing your body.

Bone fractures/Bone density

Building bone health is very important in any individual's daily life, however Celiac patients can have a harder time doing so on a regular basis. Celiac disease can result in a lack of bone health and strength because a higher percentage of patients with Celiac Disease lack magnesium, calcium, and vitamin D to support their bones. Those without Celiac Disease are not deficient of these nutrients and use them to create healthy building bones to work together in a person's body. Having a sufficient amount of vitamin D allows for 30-40% of intestinal calcium to be absorbed, however if there is a deficiency of vitamin D only 15% of calcium gets absorbed, which is typical in Celiac patients. This leads to poor bone health in the individual. It is amazing how one nutrient being deficient can further the individual to indirectly change the status of other nutrients (Expert, P., 2018). In another study done on children with untreated Celiac Disease, it

was found that in addition to being deficient in vitamins and nutrients, they had 30% lower zinc levels. Checking for nutrient levels in Celiac Disease patients is done by the spectracell's micronutrient test. This test measures thirty five vitamins and minerals with their functions of each. This test gives scientists the most accurate evaluation of a body's deficiencies. The micronutrient test can also show a Spectrox score which is important in finding Celiac Disease because the oxidative stress of an individual is an important factor when checking for Celiac Disease diagnosis (Expert, P., 2018). Celiac Disease is also studied as having many other risks such as low bone density. This is especially high in those who did not get diagnosed until adulthood because they consumed gluten for such a substantial period of time that their small intestines were not able to absorb enough calcium and vitamin D (Todd, K. n.d.). A chief clinical dietitian, Amy Jones, argues for food being the number one best defense and prevention of osteoporosis for Celiac Disease patients. Her recommendations to boost calcium and vitamin D levels are to consume dairy products, almonds, and other calcium- enriched foods (Todd, K. n.d.). Bone health is related to the diet of an individual and following a gluten free diet is very crucial for Celiac patients.

Studies on relationships of Celiac Disease and bone health

Throughout the years the development of osteoporosis in undiagnosed Celiac patients has been increasing, and the two have become intertwined in diagnosing Celiac Disease. Osteoporosis can be a reflection of untreated Celiac Disease as the small intestines' responsibility of absorbing nutrients such as calcium is essential for building and maintaining healthy bones. However, as Celiac patients have difficulties absorbing these on their own, they have to absorb these nutrients in another way. Keeping bones healthy and maintaining nutrients are crucial particularly because low bone density is common in adults and children with untreated and

newly diagnosed Celiac Disease (National Resource Center. N, 2018). Today, “the prevalence of osteoporosis and osteopenia in patients newly diagnosed with celiac disease may be as high as 75%, while only 35% of diagnosed celiac disease patients have established osteoporosis. Low bone density is common in children and adults with celiac disease; however, the risk of osteoporosis is especially high in celiac patients who weren’t diagnosed until adulthood because, as a result of consuming gluten for so long, their small intestines haven’t absorbed enough calcium and vitamin D for an extensive amount of time.” (Todd, K., n.d.).

There are many studies produced to recognize the positive impact of following a gluten free diet can have on a Celiac patient in general. It was found that patients with Celiac Disease have a higher chance of bone fractures in the peripheral skeleton on a more frequent basis. Additionally, the study “showed a 5% increase in both lumbar spine and total skeleton BMD after one year of GFD. Supplements of calcium (1 g/day) and vitamin D2 (32,000 IU once a week) did not confer additional benefits over GFD alone.” (Bianchi, M., & Bardella, M. T.,2008). Because of this, it is crucial to follow a GFD in order to sustain and progress bone health in any individual with Celiac Disease. There are many researchers which have agreed that more research has to be done into the use of supplemental nutrients. Moreover, “after one year on GFD, an increase in BMD was found only in the patients receiving supplements of calcium and 25-OH vitamin D. Increased plasma turnover and fecal excretion of 25-OH vitamin D have been found in celiac patients and this active vitamin D metabolite may be more effective than native vitamin D in correcting the deficiency.”(Bianchi, M., & Bardella, M. T.,2008). There is clear evidence that following a strict gluten free diet allows for an individual’s bones to obtain the most amount of nutrients possible to remodel the bones and helps to prevent the deterioration of the bones.

Recommendations for Public Health

With Celiac Disease becoming more common today, community public health awareness is very important to maintain. Since many autoimmune diseases are underestimated, it is based on the community to show interest and be there for those who need help. Celiac Disease changes the individual's lifestyle.

Community engagement would include posting in Celiac Disease facebook groups and other forms of social media to allow people to communicate. Also to provide information sessions for all Celiac Disease patients to attend and discuss what they are all going through together. As a result of this community interaction, missing doctors appointments and forgetting to attend follow up sessions can be changed. It has become more and more popular to forget about their doctors appointments or not being able to afford lab work to find out their health issues. This is how Celiac Disease can go untreated and unrecognized for years. The local bakeries having gluten free products allows everyone to feel included in the community. This is just another form of community involvement.

There are Celiac Disease foundations formed by community members that provide information and guide individuals to success. This tremendously impacts individuals without knowledge and who are struggling. Celiac patients share their diagnosis stories which impact those who have other health problems. Especially ones which include nutrient deficiencies and bone issues. Therefore, it is helpful for communities to address Celiac Disease as a public health issue.

Conceptual Framework: Health Belief Model

Celiac Disease is linked to bone health which is best represented by the health belief model. This model was developed to predict healthy behaviors derived from psychological and

behavioral theories (Boston University School of Public Health, 2019). In addition, this model identified that for the individual to take action, the barriers and benefits are related to healthy behavior (Boston University School of Public Health, 2019). This model examines the individuals perceived susceptibility, severity, benefits, and barriers for any illness in their cue to action to engage healthy behavior (Boston University School of Public Health, 2019).

This autoimmune disease impacts an individual's health more than noticed because of the malabsorption of nutrients. For instance, the health belief model is identified with this topic because there are individual perceptions of the ability to identify the seriousness of the autoimmune disease and changing habits to have results. It is the belief that a gluten free diet is the most prevalent cure. The health belief model recognizes the cue to take action for the change. With Celiac Disease the change in diet is important to repair the individual's gut. Also, the knowledge of the long term effects are very significant for any patient to understand. Finally, the likelihood to make the behavioral change is dependent on the confidence of the individual. It is the patient who has to commit to the change of diet and lifestyle for results.

Conclusion

Celiac Disease and bone health are definitely intertwined because of the malabsorption of many nutrients leading bone breakages and bone fractures. This autoimmune disease is only cured by following a gluten free diet. To have any Celiac patient change their lifestyle and habits, there must be an understanding of the autoimmune disease and how it is tremendously impacting their daily life. Considering I was diagnosed with Celiac Disease at the age of five, anything is possible for those who believe it is too difficult to eliminate foods off their diet. An advantage of Celiac Disease is that the only thing to make the individual better is by diet change, in contrast to other autoimmune diseases which could include medication. My advice is to never

give up on your body's health because one day this commitment of lifestyle diet change will have your body thank you.

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