



## Everything You Need to Know About Gluten and Lactose Intolerance. A review

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### ABSTRACT

Gluten and lactose intolerance are cause many foods triggered syndromes and disorders, such as celiac disease and somatoform syndrome disorder. Additionally, if it goes undetected in children it will cause developmental and psychological problems growing up. Therefore, the aim of this review is spread awareness around the complications of unrecognized gluten and lactose intolerance in addition to the ideal way for the parents to deal with these intolerances with their children. This review is divided into five main sections, firstly, what is gluten intolerance? and what are the symptoms, also the different type of gluten intolerances, the proper way to deal with each type, the psychological and pathological implications. Secondly, what is lactose intolerance? the associated symptoms, its different types, how to early detect in children, the psychological and pathological implications. Thirdly, the similarities between both intolerances. Fourthly, gluten and lactose free recipes. Lastly, short stories about gluten and lactose intolerance.

**Keywords:** Gluten, Lactose, Lactose intolerance, nutrition, food allergy, gluten ataxia, somatoform syndrome disorder.

### 1 Gluten intolerance

#### 1.1 Nutrition and Allergy

Before getting into scientific information, I'd like to briefly talk about what is the purpose behind publishing this Guidance booklet. The main reason behind writing a book of my own authorization is to spread global awareness about those two types of intolerance. This topic is not loudly spoken up to and not all parents are aware of how to behave/adapt with their gluten/lactose intolerant children. I wanted to use the passion for writing I do have, in order to help many people around me worldwide and aware parents of the severity of the condition's symptoms, and how they should deal with their children psychologically, nutritionally, allergically, and pathologically.

##### 1.1.1 What are gluten intolerances?

Gluten intolerance is basically the allergy where a person's immune system starts attacking the tissues of their small intestine which makes them unable to digest the food. The enzyme called Prolyl Endopeptidases (PEP) targets nutritious meals that are rich in gluten. When a person is gluten intolerant, this enzyme cannot function nor digest the gluten substrates in the meal, which later causes bloating and Diarrhea (Balakireva & Zamyatnin, 2016).

##### 1.1.2 What are the symptoms of Gluten intolerances? (Balakireva & Zamyatnin, 2016).

**Table 1:** symptoms of Gluten intolerances?

Musculoskeletal	Dermatological	Digestive	Neurological	Reproductive
Fatigue	Skin Rash	Bloating	Brain Fog	Hormone imbalance
Cramping	Acne Rosacea	Gas	Migraine	Fertility issues
Joint pain	Eczema	Constipation	Depression	Intensified PMS
Bruising		Diarrhea	Dementia	Lack in growth

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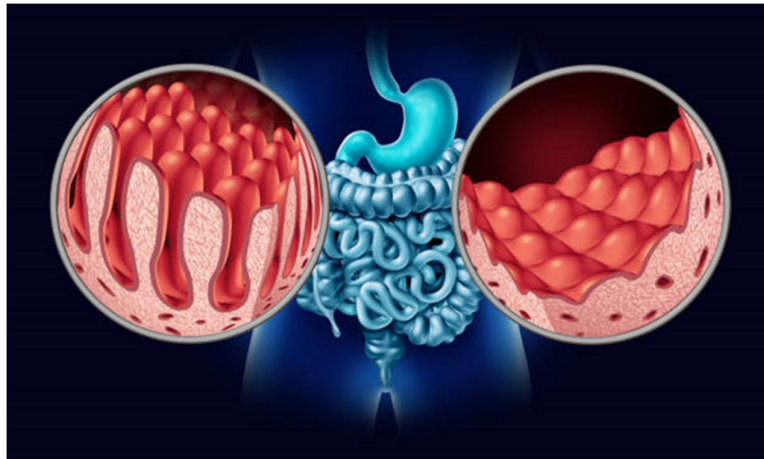
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### 1.1.3. What are the different types of Gluten Intolerances?

**A.** Celiac disease: It is an AUTOIMMUNE disorder where eating gluten damages the small intestine. It has different symptoms such as: Diarrhea, bloating, abdominal pain, and weight loss (Celiac Disease Foundation).

**B.** Gluten sensitivity: It is an INTOLERANCE to gluten, it does not harm the small intestine. It has different symptoms such as: Diarrhea, bloating, abdominal pain, brain fog, headaches (Stafford, 2022).

**C.** Wheat allergy: It is an IMMUNE response to one or more proteins found in wheat. It has different symptoms such as: Diarrhea, bloating, abdominal pain, nausea, vomiting, rash, itchy eyes, itchy throat, and trouble breathing. Furthermore, gluten proteins may engage in a synergistic interaction with cell-surface antigens to initiate an inflammatory immune response. This explains why a number of typical problems in celiac disease patients, such as type 1 diabetes, impaired thyroid function, delayed puberty, and low cortisol, are hormonal in nature (Stafford, 2022).



**Fig. 1:** Malabsorption due to poor nutrient absorption by the intestine.

### 1.1.4. How to early detect if your child is Gluten intolerant?

There are several ways in order to detect that your child is gluten intolerant. Some of those techniques are: Blood tests (we will discuss later in the pathology chapter), A biopsy of tissue from the small intestine is the most accurate way to diagnose celiac disease but yet very severe (it is where the doctors take a sample of the small intestine and starts to simplify it in order to detect if the patient is gluten intolerant).

An IgA antibody test (A positive TG-IgA test result will be seen in 93% of celiac disease patients who eat gluten. This refers to the test's sensitivity, which measures how precisely it can identify patients who are unwell. A similar test result will come back negative in 96% of healthy, celiac-free people.), home testing by trying out food and seeing if you have those symptoms of the intolerance (Balakireva & Zamyatnin, 2016).

### 1.1.5. Can Gluten intolerances be a matter of time?

In reality, researchers found that gluten sensitivity may be a transient condition, unlike celiac disease, which requires a lifetime commitment to a gluten-free diet. One of the authors of the JAMA research and the director of the celiac center, Alessio Fasano, M.D., noted that there are still many unanswered questions about non-celiac sensitivity, including whether it is a transient or ongoing illness (Celiac Disease Foundation).

## 1.2. Psychology

Psychology plays a great role in the development of diseases/intolerances within the child. A child who is gluten intolerant lacks different normal lifestyles that he witnesses his friends or even siblings go through. Either in their eating or behavioral habits. Parents should be keen to notice the psychological changes that happen within their child and explain to their children what actually occurs in their body and how to adapt towards it as well as ALWAYS show comfort (Croall *et al.*, 2021).

### 1.2.1. What is the relation between gluten and Autism?

Although there isn't enough evidence to suggest that everyone with autism should follow a gluten- and casein-free diet, some people claim to feel better when they do. When following a gluten- and casein-free diet, every food that contains either of these proteins must be avoided. A diet devoid of casein and gluten carries some risk. The gluten-free diet (GFD) has been demonstrated to reduce the behavioral and intellectual problems associated with ASD, and epidemiological studies have also indicated a connection between ASD and celiac disease. (Croall *et al.*, 2021).



Fig. 2: Gluten-free diet helpful against AUTISM symptoms.

### 1.2.2. How can gluten intolerances affect the behavior of a child?

Patients with gluten sensitivity can encounter a wide spectrum of neurologic and mental side effects. It is interesting that the primary presentation in people with this syndrome may be neurologic and mental symptoms, as found in gluten-sensitive patients, given the lack of stomach involvement.

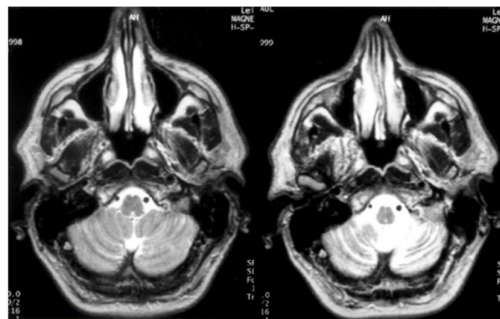


Fig. 3: The picture shows Gluten sensitivity as a neurological illness in a human brain.

The reaction of a toddler to a food they are intolerant to may cause behavioral issues. In children who have some sensitivity to this protein, eating things containing gluten and being hyperactive seem to go hand in hand. Aggression and impatience are two other negative traits that gluten may contribute to (The Signs and Symptoms of Gluten Sensitivity, n.d.).

### 1.2.3. What is gluten psychosis?

Gluten psychosis is a syndrome that is characterized by symptoms that go away when a patient eliminates gluten from their diet. The diagnosis of non-celiac gluten sensitivity is made when wheat allergy and celiac disease have been ruled out in those whose symptoms improve after they stop

consuming gluten (NCGS). Schizophrenia, depression, and autism are just a few of the neuropsychiatric conditions that NCGS has been linked to Lionetti *et al.* (2015).

#### **1.2.4. What is gluten ataxia and what are its symptoms?**

An immunological reaction to the gluten protein found in wheat, barley, and rye causes gluten ataxia, a rare neurological disorder that can permanently harm the cerebellum in your brain. You might have problems with your gross motor skills and walking, which could make it difficult for you to maintain coordination. Its symptoms include difficulties speaking, using the fingers, hands, arms, or legs, or moving the eyes or body. tingling in the legs, impaired coordination and/or balance gait difficulties, damage to the cerebellum (the part of the brain that controls coordination) (Gluten Ataxia and Celiac Disease | BeyondCeliac.org, 2022).

### **1.3. Pathology**

The study of illnesses' causes and effects is known as pathology. This medical specialty focuses on the laboratory analysis of bodily tissue samples for forensic or diagnostic purposes. This helps in the indication of gluten intolerance, as it could be indicated and specialized by conducting some blood tests.

#### **1.3.1. How is pathology related to detecting gluten intolerances?**

Gluten sensitivity is hereditary and can be passed down through generations. The tissue is examined for signs of celiac disease by a pathologist, a doctor who investigates diseases under a microscope. for indications of celiac illness, such as weakened villi and inflammatory cells in the intestine. The Immune cells (antibodies) reacts with the intestine's goblet tissue (Celiac Disease - Diagnosis and Treatment - Mayo Clinic, 2021).

#### **1.3.2. What blood tests are needed to be done in order to detect if this person has gluten intolerance?**

You can determine if you are gluten intolerant with five blood tests. During a serology test, your blood is examined for antibodies. Increased levels of particular antibody proteins are evidence that gluten has induced an immune response. Genetic testing for human leukocyte antigen can be used to rule out celiac disease (HLA-DQ2 and HLA-DQ8). TTGIGA indicated that the damage that occurred in the intestine was recent which tells us that this patient Is a gluten-intolerant patient. The TTG can also be examined by taking a tissue lining of the intestine and see to how long is it affected by the layers (Biopsy) using a recent diagnostic tool which is invasive TTGIGG indicates that this person suffers from gluten intolerance since a while ago. They both do not give ranges they are either positive or negative values. EMAIGA is not a common blood test that all patients go through but it indicated the severity of the intolerance and to what damage extent did the intolerance reach. This is usually done for patients with severe symptoms. Genetic markers (HLA-DQ2 / HLADQ8) are tests that should be made before marriage in order for a married couple to know if they are expecting a gluten intolerant child (is there a percentage that their child might be gluten intolerant?). They indicate genes that are located in chromosome 6p21. Runs in families and hereditary and a first degree can be there at any age (Celiac Disease - Diagnosis and Treatment - Mayo Clinic, 2021).

## **2. Lactose intolerances**

### **2.1. Nutrition and allergy**

Your health could be impacted by lactose intolerance if it prevents you from consuming adequate calcium and vitamin D. Make sure you consume calcium each day if you are lactose intolerant. Your body uses and absorbs calcium with the aid of vitamin D. Eat vitamin D-rich foods like eggs and certain fish, like salmon, to enrich and restore the vitamins you lack from Milk (U.S. Department of Health and Human Services, n.d.).

#### **2.1.1. What are Lactose intolerances?**

Lactose intolerance is the most common food allergy in infants and young children and many times it is overlooked. The enzyme lactase, which is synthesized in the small intestine, is usually the cause behind lactose intolerance. Even if you have low lactase levels, you can still digest milk products.

However, if your levels are too low, you suffer discomfort after consuming dairy products and develop lactose intolerance.

### 2.1.2. What are the symptoms of Lactose intolerance?

The symptoms of lactose intolerance are not so different from that of Gluten intolerance. The reaction may occur immediately within minutes after the child eats or drinks products that contain lactose, or it could take several hours and even days for the symptoms to start visualizing on your child after consuming meals rich in lactose. Some of these symptoms may include: *Diarrhea, Vomiting, Skin Rash, Extreme Fussiness, Low/No weight gain, Gassiness, Blood in stool, Spitting up* (Lactose Intolerance, 2021).



Fig. 4: Lactose intolerance symptoms.

### 2.1.3 What are the different types of Lactose Intolerances?

- A. Primary Lactose intolerance: This type of lactose intolerance is the most prevalent. Most people are born with enough lactase. For infants to effectively digest their mother's milk, the enzyme is required. Over time, a person's capacity to make lactase may decline. This is because as people become older, their diets get more varied and they drink less milk. Lactase eventually disappears from the body. This type of lactose intolerance is more prevalent in people of Asian, African, and Hispanic origin. (Cafasso, 2019)
- B. Secondary Lactose intolerance: It happens due to surgery or illness. Surgery, small intestine injuries, intestinal diseases such as celiac disease and inflammatory bowel disease (IBD), as well as general intestinal conditions, can also cause lactose intolerance. Lactase levels could improve with the treatment of the underlying disease. (Cafasso, 2019)
- C. Congenital or developmental lactose intolerance: Sometimes, lactose intolerance is hereditary. A defective gene inherited from the parents may cause a child to be born without any lactase. This disorder is known by the medical term congenital lactose intolerance. In this instance, your baby won't tolerate breast milk. They will start to get diarrhea as soon as human milk or a formula containing lactose is supplied. If the condition is not recognized and treated quickly away, it could be fatal. Diarrhea cause electrolyte loss and dehydration. Milk can be simply replaced with lactose-free infant formula to solve the issue (Cafasso, 2019).

### 2.1.4. How to early detect if your child is Lactose intolerant?

- A. Symptoms developing: This is the most common way in order to detect if your child is suffering from Lactose intolerance. This is by noticing if symptoms develop in your child after consuming meals that are rich in lactose (NHS).
- B. Hydrogen breath test: In this technique, your child drinks a lot of lactose-containing beverages. Then, regular measurements of the amount of hydrogen of the breath are conducted. If there is a lot of hydrogen present, your child is lactose intolerant (NHS).

C. Stool acidity tests: The patients of this test are infants and young children. The amount of acid in the stool is measured. If your child is not digesting lactose adequately, lactic acid, glucose, and other fatty acids will be found in the stool (NHS).

### 2.1.5 Can Lactose intolerance be a matter of time?

Lactose intolerance normally goes away after the underlying reason is treated, but in a few rare cases, it may last forever. Such digestive damage appears capable of, though not likely to, result in the same epigenetic change that frequently turns off the lactase gene in a child (Foster, 2019).

## 2.2 Psychology

### 2.2.1 The relation between lactose intolerance and people who suffer from somatoform syndrome disorder?

The enzyme lactase, which breaks down lactose, is absent in people with true lactose intolerance. Those who have it claim that lactose, a milk sugar, causes them to feel bloated, gassy, sick to their stomachs, and nauseated when consumed or drunk. When a person has a somatoform disorder, their psychological issues are what actually cause their physical symptoms and agony. According to Dr. Guido Basilisco, a researcher in the gastrointestinal division at IRCCS-Ca Granda in Milan, the findings of this new study demonstrate that certain people "should not blame lactose for symptoms of lactose intolerance." Patients with malabsorption accounted for 33% of the population, while those with lactose intolerance made up 29% (HealthEngine Blog, 2019)

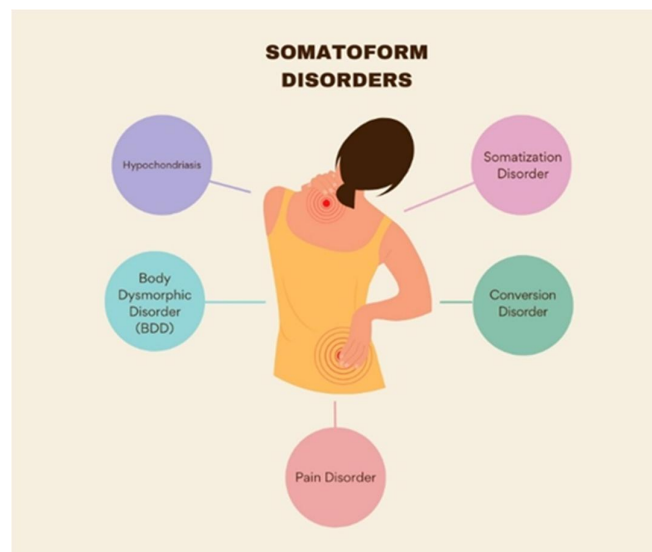


Fig. 5: Main symptoms of somatoform disorder.

## 3. What is similar between both intolerances psychologically?

The child under such circumstances needs to be well taken care of him/her. Not only nutritionally, but also psychologically. The child under such circumstances feels different from those he is surrounded with. His life routine and his diet differ from others and this leads most children into deep depression and also, they could be bullied. If the parents do not know how exactly to deal with their children's psychological and mental health under those circumstances, especially in the child's early years, this could lead the child into severe mental illnesses.

### 3.1. How can a child be affected psychologically when he/she suffers from different allergy intolerances (Gluten and Lactose)?

According to research conducted in the UK, children with celiac disease traditionally had a 1.2–1.8 higher risk of psychological illnesses such as depression, mood disorders, behavioral problems, ADHD, eating disorders, autism, depression, and other mental difficulties if parents are not aware



enough of how to deal with their children in such circumstances (Can food intolerance cause behavioral issues in children? Brain Balance Achievement Centers).

### **3.2 Can food allergies ever be psychological?**

In a 2003 case study, a connection between the body and the brain was demonstrated. One of the most common and severe allergies is a peanut allergy. A patient who thought they had a peanut butter allergy in the study actually had a psychosomatic symptom. Numerous allergic disorders, long thought of as psychosomatic conditions, have been linked to poor outcomes in individuals with high levels of psychosocial stress. Parents' possible allergy concerns may prohibit them from feeding their children jointly. Food allergies are more likely to develop over time in people who avoid substances that are seen as harmful but have not been scientifically shown to be harmful. The majority of the patients' digestive problems were found to be psychological in origin rather than the result of lactose intolerance. These people spoke of a range of problems in different body areas, such as weakness in specific body parts or feeling dizzy, but no medical cause could be found (Doheny, 2022).

### **3.3 How can parents take care of their child's mental health under such circumstances?**

In these situations, parents are crucial to the emotional and psychological well-being of their kids. Children who are lactose- and gluten-intolerant do in fact have a unique diet. Your child may become bullied as a result of this. This might be reflected in their diet, weight, or even way of life. With their children, parents should be more open and vulnerable. You need to do the following things to keep your autistic child's mental state stable (Admin, 2018).

#### **3.3.1 Educate and support them**

Explain what celiac disease is in detail and how it differs from non-celiac gluten sensitivity. Justify the necessity of a strict gluten-free diet for health maintenance. To read together and try out new recipes, pick from the more than a dozen different books and cookbooks written for kids with celiac disease and other gluten intolerances (Admin, 2018).

#### **3.3.2 Use role-playing exercises**

Dr. Rakow leads support groups for those who have celiac disease at Children's National utilising a variety of cognitive behavioural psychotherapy techniques. With the aid of these techniques, students have improved their ability to speak up for themselves in front of their peers, choose healthy options when going out or shopping, and resolve issues in school cafeterias.

To put these skills into practice, Dr. Rakow might take the kids to the hospital's food market where they can spread out and choose items to bring back to the group for discussion about their health. (Admin, 2018).

#### **3.3.3 Being surrounded by supportive peers**

According to Dr. Rakow, parents can help students develop a "network of peers" for socializing outside of the classroom. Your child's close friends may be part of the network if their families are open to learning about celiac disease, stocking their kitchens with gluten-free foods, and monitoring cross-contact. The goal is to provide a safe and welcoming environment for your child to attend so that she may stop thinking about having celiac disease and stop worrying about their next meal. After having this network, your child may need to talk about celiac disease less and less. (Admin, 2018).

#### **3.3.4 Fairness**

Make sure you are fair when it comes to serving meals with them and their siblings. The meals you offer for all your children either intolerant or not should be similar so the child does not feel left out. (Admin, 2018).

## **4. Recipes (Gluten and lactose-free)**

### **4.1 Gluten Free Sponge Cake (Audrey, 2020)**

Prep time: 1 hour

Cook time: 45 minutes

Total time: 1 hour and 45 minutes

**Ingredients:**

- 150g granulated sugar.
- ½ teaspoon cream of tartar or 1 tablespoon freshly squeezed lemon.
- 88g basic free gluten free flour.
- 2 tablespoons (18g) cornstarch.
- ¼ tablespoon salt.
- 1 tablespoon pure vanilla extract.
- 200g (weighed out of shell) eggs separated.

**Directions:**

- 1) Set the oven to 350 °F. A 9-inch round cake pan should be thoroughly greased and set aside.
- 2) The eggs yolks and ½ cup (100g) sugar should be combined in a large bowl and mixed with a hand mixer or a whisk until pale yellow.
- 3) Combine the flour mixture. Corn flour, and salt by sifting them into the egg yolk mixture.
- 4) Transfer the egg yolk mixture to a small bowl and set it aside.
- 5) After thoroughly cleaning the mixer bowl, add the egg whites and cream of tartar (or lemon juice) to the bowl with the whisk attachment.
- 6) Until soft peaks form, beat the egg whites at the medium-high speed. When glossy, stiff (but not dry) peaks start to form, add the remaining ¼ cup (50g) of sugar and beat until they do.
- 7) Slowly add the vanilla and egg yolk combination to the egg white mixture while running the mixer at medium speed. Beat until barely mixed. The combination ought to be shiny and smooth.
- 8) Spread a uniform layer of batter into the pan that has been prepared.
- 9) Place in the middle of the preheated oven and bake until the cake starts to pull away from the pan's sides and the toothpick comes out largely clean or with a few moist crumbs attached (about 35 minutes).
- 10) Prior to moving the cake to wire racks to finish cooling, give it about 10 minutes to cool in the pan.



**Fig. 6:** Gluten Free Sponge Cake.

**4.2 Gluten free pancakes (Hunn, 2022)**

**Ingredients:**

- 2 tablespoon sugar.
- 2 tablespoons vegetable oil.
- 1 egg.
- 1 teaspoon pure vanilla extract.
- 1 cup of all-purpose gluten-free flour.
- 1 tablespoon gluten-free baking powder.
- ¼ teaspoon of salt.
- ¾ cup milk.





**Fig. 7:** Gluten free pancakes.

**Directions:**

- 1) The egg, sugar, vanilla extract, and vegetable oil should all be combined in the big plate.
- 2) Salt, gluten-free baking powder, and gluten-free flour should all be added to the egg mixture and thoroughly blended.
- 3) Add the milk and blend well. Stir in 1-2 tablespoons of milk to make pancakes that are thinner.
- 4) Pour the batter for each pancake onto a griddle or pan that has been oiled using a 14-cup measuring cup.
- 5) Pancakes should be cooked until the batter bubbles and they begin to puff. The pancakes should be flipped or turned over and cooked until golden brown.

**4.3 Gluten-free samosa**

**Ingredients:**

- 2 tablespoons of corn starch (for those who like it crunchy)
- 2 cups of all-purpose flour.
- 2 tablespoons of powdered milk for faster browning.
- 1 tablespoon of xanthan gum.
- ½ teaspoon of salt.
- 3 tablespoons of oil.
- Cup pf water (it decreases or increases according to the type of flour and the strength of kneading).



**Fig. 8:** Gluten-free samosa.

**Directions:**

- 1) Mix all the ingredients in the kneading basin using the hook mixer.

- 2) Gradually add water and knead until it becomes a cohesive, soft, elastic dough between the texture of a tortilla and Arabic bread. It does not stick to the hand.
- 3) Let it rest for five minutes.
- 4) Then, take a part and wafer it with cornstarch flour and shake off the excess starch with a brush. Use the puff cutters for large cuts.
- 5) Stuffing the smallest ones, after cutting all the dough, then the pieces are collected on the top of each other and covered with plastic.
- 6) Store to take a piece and stuff the smaller puff with cutter and stuff the small ones.
- 7) The tray is afterward transferred in it with plastic and covered until it is finished.
- 8) Then it is fried directly or placed in the freezer uncovered until it freezes.
- 9) Lastly it is collected, canned, and preserved for the time of need.

#### 4.4 Gluten-free cookies

##### Ingredients:

- 2 cups of pesos' flour or all-purpose gluten-free flour.
- 2 tablespoons of cocoa powder
- ½ cup of sugar
- ½ a teaspoon of bicarbonate
- A pinch of salt



**Fig. 9:** Gluten-free cookies.

##### Directions:

- 1) Mix the dry ingredients together with the peso flour, cocoa, sugar, salt, and bicarbonate, then add the oil and eggs.
- 2) Add two eggs and a ½ cup of oil, mix them with a spoon, then continue kneading by hand.
- 3) Prepare a tray with parchment paper and start rolling the dough into small balls.
- 4) Start distributing the cookies dough on the tray.
- 5) Place it in the oven in the below area only for eight minutes, medium heat, and the rack in the middle.
- 6) After the oven, leave it for two minutes, then remove tray.

#### 4.5 Gluten-free burger buns

##### Ingredients:

- 2 ½ cups of all-purpose flour
- 2 tablespoons of powdered milk (optional)
- 1 tablespoon of sugar (optional)
- Teaspoon of baking powder (optional)
- ½ teaspoon of wax it is preferable if ½ a teaspoon of salt is available
- 1 egg (optional)
- 2 tablespoons of butter or two tablespoons of oil
- Cup of milk or water (it decreases or increases according to the type of flour and the strength of kneading)



**Fig. 10:** Gluten-free burger buns.

**Directions:**

- 1) Mix all ingredients in a mixing bowl and gradually add the liquid ingredients.
- 2) The last texture of the dough is soft, sticky, and rubbery. It is necessary when shaping to wear gloves and grease the hands with oil.
- 3) Take part and ball with light plump on top.
- 4) After the formation is finished, wipe it with a little olive oil.
- 5) Cover it with plastic for ten minutes to ferment.
- 6) Before putting it in the oven, wipe it with a little milk (preferable).
- 7) Put it in a preheated oven five minutes before the fire is closer to the high and the rack is in the middle and the sheet is last seven minutes from the bottom.
- 8) When done, close the oven heat and let it sit down for 5 minutes before placing it outside.
- 9) In bags and in the freezer when needed, heated in the microwave from 20 to 30 seconds, or according to the power of microwave.

**4.6 Lactose free bread (Justine, 2022)**

**Ingredients:**

- Lukewarm water (lactose-free milk could also be used if available)
- Instant yeast
- Sugar
- Vegetable oil
- All-purpose flour
- Salt



**Fig.11:** Lactose free bread.

**Directions:**

o Dough

- 1) Combine the warm water, yeast, and cane sugar in a large mixing bowl. Cover with a clean towel and set aside for 10 minutes to bloom.
- 2) In the meantime, whisk 6 cups of flour and salt together in a large mixing bowl. Once the yeast mixture looks frothy, mix it with the dry ingredients, and add the oil.
- 3) Knead the dough by hand or with an electric mixer (with a hook attachment) until a smooth dough forms, about 10-15 minutes. Add more flour  $\frac{1}{4}$  -  $\frac{1}{2}$  cup at a time until the dough is no longer sticky (we typically need  $6\frac{3}{4}$  cups or 810 grams).
- 4) Transfer the dough to a lightly oiled bowl and cover it again. Let it double in size, which takes about 40-45 minutes in a warm place — We prefer our Instant Pot set to Sous Vide at 80 degrees F, but you can leave it in your oven with the light on.

o Shape

- 1) Gently punch the air out of the dough and shape it into a ball. Transfer it to a well-floured surface, divide it into 2 even halves, and roll each one into a loaf shape.
- 2) Add them to 2 lightly greased loaf pans, and let proof for about 30-35 minutes. In the meantime, preheat your oven to 425 degrees F, then lower the heat to 350 degrees F before putting the bread in.
- 3) Bake for 30-35 minutes, or until the tops are golden brown. Remove from the oven and let cool on a wire rack before slicing.

**4.7 lactose-free sponge cake (Food.com, 2021)**

**Ingredients:**

- 6 eggs
- $\frac{3}{4}$  teaspoon cream of tartar
- 1 cup sugar, divided
- 1 cup cake flour (All-Purpose)

**Directions:**

- 1) Preheat your oven to 350°F, and cut two pieces of parchment paper to fit the bottoms of two 9-inch round cake pans.
- 2) Separate the eggs, putting the whites in large mixing bowl and the yolks in a small mixing bowl.
- 3) Add the cream of tartar and  $\frac{1}{2}$  cup sugar to the whites and beat with a mixer or hand mixer (you can use a whisk, but it's a workout!) until stiff peaks form.
- 4) Add the remaining  $\frac{1}{2}$  cup sugar to the yolks and beat or whisk until very thick and light yellow in color.
- 5) Gently fold the egg yolk mixture into the egg whites.
- 6) Gently fold in the flour,  $\frac{1}{3}$  cup at a time, until combined. Do not overmix.
- 7) Pour the batter into your prepared cake pans.
- 8) Bake the cakes for about 25 to 30 minutes, or until a toothpick inserted in the center of the cakes comes out clean.
- 9) Let the cakes cool for a few minutes in the pans, before carefully removing them and taking off the parchment paper. Let the cakes cool completely.

**4.8 Lactose-free pancakes (Belanger & Belanger, 2022)**

**Ingredients:**

- 1  $\frac{1}{2}$  cup all-purpose flour
- 1 tablespoon sugar
- 1 tablespoon baking powder
- $\frac{1}{2}$  teaspoon salt
- 1  $\frac{1}{4}$  cup almond or coconut milk\*
- 3 tablespoons canola oil
- 1 egg
- 1 teaspoon vanilla extract

**Directions:**

- 1) In a large bowl, whisk together the dry ingredients.
- 2) Add milk, canola oil, egg and vanilla extract. Whisk until smooth.
- 3) Preheat a non-stick griddle or large skillet to medium heat. (Coat pan with butter or oil if not using non-stick).
- 4) Pour about 1/3 cup batter onto the griddle for each pancake. Allow it to cook until bubbles are visible throughout the pancake before flipping.
- 5) Repeat until all batter has been used.

**4.9 Lactose-free cookies (Belanger & Belanger, 2021)**

**Ingredients:**

- 2 1/2 cups all-purpose flour
- 1 teaspoon baking soda
- 1 teaspoon salt
- 1 cup vegetable shortening
- 3/4 cup dark brown sugar
- 3/4 cup sugar
- 2 eggs
- 1 teaspoon vanilla
- 1 cup dairy free chocolate chips

**Directions:**

- 1) Preheat oven to 350°F and line a baking sheet with parchment paper.
- 2) In a medium bowl, whisk together flour, baking soda and salt. Set aside.
- 3) In a large bowl with an electric mixer, beat shortening and sugars at medium speed until light and fluffy – about 2 minutes. Add eggs and vanilla, beating until combined. Add flour mixture, about 1/2 cup at a time, mixing until incorporated, scrapping sides as needed.
- 4) Stir in chocolate chips.
- 5) Using a medium cookie scoop, drop 2 tablespoon balls of dough onto cookie sheet. Bake for 10 – 11 minutes.
- 6) Remove from oven and allow cookies to cool on baking sheet for about 5 minutes before transferring to a cooling rack.
- 7) Repeat steps 6 – 7 to bake remaining cookies.

**5 Gluten and Lactose short story**

**5.1 The Gluten-free kingdom**

Once upon a time, there were 4 siblings who lived happily with their Grandmother. Lily, Sam, Eric, and Rose. They used to have a “story tell Sunday” every Sunday with their grandmother. On one Sunday, the children’s grandmother decided to gather them and have a small talk before telling them about her ancient past.

Rose was always feeling like she is left out. Rose is a unique, brave, and clever sibling, she is Gluten intolerant. Her grandmother felt that Rose is slowly becoming an introvert and she is feeling different from others around her, that’s why she decided to tell them about her story, today.

“Let me tell you a secret my little ones”. The grandmother approached the siblings.

“oh my god, you have secrets to tell!” Replied all 4 children in one voice “When I was a little child, I used to have severe symptoms like acne, cramps, constipation, and even diarrhea whenever I consume food rich in Gluten, barley, or rye.” Said the grandma.

“Like Rose?” Added Eric

Rose’s face started to tilt downwards when she heard that.

“Hey my little dear, look up here”. Said the grandma in a calm voice while tilting Rose’s face upwards.

“I had the same intolerance you have now, Gluten intolerance. I was insecure about it when I started to grow up and notice how other people around me are having a different lifestyle than mine. But you know what, my mother told me something that totally changed my perspective towards this intolerance. And that’s what I am here to tell you, kids, about today.” Proceeded the Grandma.

“Really Grandma? So, I am not the only child? Tell us about it, what did your mother tell you?”  
Wondered Rose

“There is an island called the Gluten-free island, where all Gluten intolerant children can visit. It is full of food that is unique, only made for beautiful kids like you my dear.” Spoke up the grandma confidently.

“Can we visit too, grandma?” Asked Sam and Lily innocently.

“You have a different island you can go to; I’ll tell you about next Sunday. It is called Dairy free land”  
Whispered the Grandma into Sam and Lily’s ears.

“Continue Grandma, what is this island?” Inquired Rose

“The island is all fun and games until the Gluten Dragon appears. This Dragon is what rules the island. He is responsible to test if children there are actually Gluten intolerant or not. He wants the island to be only for those Gluten intolerant children so they can enjoy this island alone!” Continued the grandma  
Rose interrupted “How does he know?”

Laughed the Grandma hysterically “Looks like you are so excited little Rose, there are defined magic words that only Gluten warriors know, they say the magic words all in one voice. Those who don’t, are detected by the Gluten Dragon, and they are served to be replaced”.

“That is not fair grandma, we are intolerant too, let us know!” Said the other 3 kids in one voice

“You are not Gluten intolerant, you are Lactose intolerant. You have your own island as well. Let me tell you about it next week!” Said the Grandma

“What are the secret magic words?” asked Lily

“I cannot tell you, it’s a secret” Said the grandma laughing

“I want to go Grandma; tell me how can I go”. Said Rose

“Whenever you eat a meal that does not include Gluten, the Gluten dragon will know, and he will send you to his island.

“I AM GOING NOW!” Said Rose running towards the kitchen

“Wait let me tell you the magic words first!” Approached the grandma ““No Wheat, No Barley, No Rye, Gluten dragon Be Gone, Good Bye!” “Whispered the Grandma into Rose’s ears (**Belanger, 2021**)

## **5.2 The magical lactose**

Once upon a time, there was a boy named Leo. Leo was lactose intolerant. He was not able to eat food that contain dairy, this caused him severe symptoms of uncomfortableness. Leo was always being picked on at school. Children in his class always pointed out the fact that he is different and he is unwelcome. These situations made Leo go into severe depression. He was not able to concentrate or be in contact with anyone.

A girl in Leo’s class witnessed the whole situation Leo is going through and the obvious changes that had occurred to him. She was telling the school’s psychological doctor about Leo’s concern, and she tried getting closer to Leo.

“Hi, I am Anne. Can I sit with you?” Anne approached Leo.

“Umm, Hi Anne. You you can sit I guess” Said Leo nervously

“Don’t be nervous, I actually would like to get to know you better, tell me more about yourself.”

“I am Leo. I like to cycle and read. What about you?” Said Leo openly

“That’s interesting. I like to read too. But I do not know how to cycle though. Tell me about your friends, do you have any?”. Asked Anne “Not really. All here do not accept me just because I am Lactose intolerant. They find me different. I even once tried to consume food that actually contain dairy so I can prove them wrong, and that got me so sick that I even went to the hospital” Replied Leo

“Oh my god, I hope you are okay by now but Lactose intolerant? What does that mean?” Inquired Anne

“Basically, it means, if I had drunk milk or any other related dairy products, it would make me sick since I am not able to digest it, I need special dairy products, like lactose free milk. “Leo explained as he could

“But that does not make you feel different, this makes you special and unique. You should be proud of yourself for going through such circumstances but still stand strong. You are a warrior. And keep in mind that not everyone will like you and it is normal.” Said Anne trying to comfort Leo.

“You are the first one that actually makes me feel accepted. Thank you Anne”



“You’re most welcome, but do not forget to talk to our psychological doctor whenever you feel like you need help at school or you are getting bullied. She will help you go through it because you are not alone.” Continued Anne

“Thank you, I will go to her now” Replied Leo

Leo went to the psychological Doctor’s office right after he finished his talk with Anne. He felt like he should make a change, as well as he should not stand still when someone bullies him. He knocked on the doctor’s office and she let him in.

“Oh my dear Leo, how are you?” Said the doctor cheerfully

“Hi doctor Susanna, I want to talk to you about my lactose intolerance and how people treat me just because of an intolerance I have no hand in it.” Sobbed Leo

“Do not cry my love, this is so brave of you to come and speak up. Thank you for letting me know. Also, Anne noticed how off you were the past period and she told me that she wants to help you get over them” Added Doctor Susanna.

“She did?” Asked Leo while whipping off his tears

“Yes Leo, she is such a great friend. You know what? My baby daughter suffers from this intolerance as well but what comforts her is her knowing that she is built differently. Not in a negative way, but in a positive one. This intolerance is what makes her special compared to the 7.837 billion people in the world. This is what makes her unique, and so does it make you. Lactose is magical, it can either make people unique as they are not able to digest it or it can make you a regular person and you are able to digest it and consume dairy-rich food. Lactose chose the path into your body in making you special. This is the power of the magical lactose, you little magical warrior.” Said Dr. Susanna.

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