

Awareness of gluten-free diet among the general public in Saudi Arabia

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ABSTRACT

Introduction: Gluten is the combination of gliadin and glutenin within a fraction of wheat. Its fraction is used in food processing because of its unique structure-building attributes. The gluten in wheat flour forms a three-dimensional protein network when mixed and hydrated properly. Even those without a diagnosis of an illness linked to gluten are beginning to follow a GFD.

Methodology: This study aimed to examine the knowledge and use of the gluten-free diet among the general population of Saudi Arabia. This cross-sectional study included participants 18 years and older. Frequencies and percentages were used for descriptive data.

Results: A total of **793** were included in the study. More than half of the participants knew what gluten and gluten-free diet are. Females demonstrated a greater awareness of gluten-free diet and their use (%). Other questions on the prevalence of gluten-free diet use showed that 5% follow it rigorously, while 10.3% follow it with lapses.

Conclusion: The majority of the respondents were aware of the gluten diet; mostly, the gluten-free diet was followed due to health-related lifestyles. Future research on a broader scale in SA is highly needed to better understand the Saudi population.

KEYWORDS

Gluten-Free Diet, Gluten Sensitivity, Celiac Disease, Saudi Arabia.

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INTRODUCTION

Gluten is the combination of gliadin and glutenin within a fraction of wheat. Its fraction is used in food processing due to its unique structure-building attributes. Gluten is in various types of food, such as barley, rye, wheat, and oats, which have ethanol-soluble proteins¹. The prolamins comprising gluten, e.g., glutenin and gliadin, are lengthy peptide molecules humans have difficulty digesting. These peptides have a variety of biological properties that could play a role in the pathogenesis of gluten-related disorders².

A long-life Gluten-Free Diet (GFD) is widely accepted as the gold standard for patients with gluten-related disorders, including celiac disease and gluten ataxia, where immune-mediated inflammatory responses to gluten proteins are directed predominantly against the small intestine mucosa and irreversibly cause damage to the cells in the cerebellum. In addition, GFD is also used in non-celiac gluten sensitivity disorder, which presents with symptoms similar to those of celiac disease; however, it does not damage the intestinal mucosa to the degree that celiac disease does².

The ingestion of grains such as wheat, rye, and barley by individuals diagnosed with celiac disease is thought to be linked to irritable bowel syndrome-like symptoms. As a result, non-celiac gluten sensitivity (NCGS) has developed as a diagnosis for people who do not have celiac disease or wheat allergy but who experience irritable bowel syndrome (IBS) like gastrointestinal symptoms after consuming gluten-containing foods and who improve on a GFD. In the case of patients with irritable bowel syndrome (IBS), the majority are seeking specific diets that are low in gluten, fats, and carbohydrates, which have been shown to improve IBS symptoms³.

Another very uncommon gluten-related condition that necessitates avoiding wheat in the diet is IgE-mediated wheat

allergy. People who lack identified clinical characteristics have adopted a GFD because of the claimed health advantages or thinking that consuming gluten has a negative or irritating effect. Moreover, a GFD can positively affect patients with psychiatric illnesses like schizophrenia and depression³. A gluten-free diet may be successful in reducing one or more of autism's defining symptoms⁴. Other than diseases, GFD is widely used by athletes, and interestingly, they believe it improves their performance and helps in weight loss. However, all the studies conducted on these subjects found that there is no effect on athletic performance³.

Gluten-related disorders (GRDs) are increasing, estimated to affect approximately 5% of the world's population. There are five significant GRDs characterized by a wide range of clinical symptoms, including celiac disease, dermatitis herpetiformis (DH), gluten ataxia (GA), wheat allergy (WA), and non-celiac gluten sensitivity (NCGS)⁵. In Saudi Arabia studies reveal that celiac disease has the highest prevalence among the general adult population (3.2%), where women demonstrated a higher prevalence of celiac disease than men. Children in Saudi Arabia are estimated to have a disease frequency of 1: 250-100, and approximately the peak of diagnosis falls around the age of 1 to 3 years⁶.

Even those without a diagnosis of an illness linked to gluten are beginning to follow a GFD. The National Health and Nutrition Examination Surveys conducted between 2009 and 2014 showed that the overall prevalence of celiac disease in the US remained steady. While the majority of undiagnosed Celiac disease fell sharply during this time, raising the possibility that the disease had been successfully identified or that people were becoming more interested in eating gluten-free. The number of people without Celiac Disease who avoid gluten more than tripled during this time, which is 1.1% reaching an estimated 3.1 million⁷. On the other hand, the statistics show that many adult Australians deliberately avoid eating items containing wheat, most often without receiving a formal diagnosis. According to reported symptoms, this behavior has a physiological but not an allergic cause⁸.

Due to gluten's ubiquity, adhering to a strict gluten-free lifestyle presents numerous difficulties. A study done by Cambridge University indicated that the adherence rate varies significantly depending on age and tends to be higher in childhood. But teens frequently struggle with adherence^{9,10}. Consumption of processed foods, attendance at follow-up appointments, and the presence of additional diseases are factors that affect GFD compliance¹¹. Contrarily, 77-90 % of people who receive a diagnosis later in life are said to adhere to their treatment reasonably well. Patients who adhere strictly to a GFD report psychological and self-awareness barriers; counseling with the dietician can be beneficial^{9,10}.

Additionally, it has been shown that dietary counseling and follow-up reviews for patients with CD are linked to higher GF

diet compliance, the remission of disease-specific symptoms, and improved quality of life. Moreover, a lack of information on gluten-containing foods is a significant but potentially controllable factor in low adherence; studies have shown a clear correlation between food knowledge and dietary adherence¹². One crucial skill that patients must have to select appropriate GF foods is the ability to read and interpret product labels. Patients were more likely to follow the GFD if they demonstrated comprehension of food labels. The cost of gluten-free products is another barrier to GFD adherence. Access to GF food for consumption at home, at work, and when traveling has been cited as a difficulty in following the GFD. An interview with South Asian patients revealed that eating out is difficult due to a lack of knowledge about GFD among restaurant staff and the inability to find GF foods in their local food stores, which affects their adherence to GFD¹³.

In Saudi Arabia, assessing the knowledge and the prevalence of gluten-free diets among the public needs to be improved. Therefore, this study aimed to examine the knowledge and use of the gluten-free diet among the general population of Saudi Arabia.

METHODOLOGY

Study design

This is a cross-sectional study among the population of Saudi Arabia. The inclusion criteria included participants 18 years of age and older. The authors used convenience sampling via an online survey. The estimated annual population of Saudi Arabia is about 38 million, with a 95% confidence level and a 5% margin of error ($\alpha = 0.05$); the sample size would be 384.

Variables, Instrumentation, and Measurement

By the end of the data collection (3 months), 793 adults in the general public completed the survey. The survey was taken from another validated study, and it was distributed in both Arabic and English languages. Content and face validity were achieved by a clinical dietitian and an official translator. The survey was pretested before data collection to ensure validity.

Ethical Considerations

No identifying data was collected to ensure anonymity, and approval was sought from the Institutional Review Board of Alfaisal University (IRB#20162).

Statistical Analysis

Data analyses were performed using SPSS software, version 27.0 (IBM SPSS, Inc., Armonk, NY). Statistical hypotheses were tested using $p < 0.05$ as the level of statistical significance for the regression analyses.

RESULTS

The descriptive demographic characteristics of the participants are shown in Table 1. The majority of the participants were females (n=457, 57.6%), while males (n=336, 42.4%). Approximately half of the participants were 18-30 years old (%). Most study participants indicated that their permanent residence was in the central region. More than half of the participants (n=424, 53.5%) had at least a bachelor's degree.

Regarding the "What is gluten?" question, most of the participants chose the correct answer, which is "A protein in wheat, rye, and barley," 25.6% of males and 16.2% of female's participants chose "I don't know" (p-value= 0.006). Table 2 shows that 610 participants reported hearing about the Gluten-Free Diet before answering the survey. When asked about the main purpose of a GFD, most participants answered, "Disease management," followed by "Healthy lifestyle." Moreover, 23.2% of

male and 9% of female participants didn't know the purpose of the GF Diet. Most respondents reported that GFD manages "Wheat allergy," followed by "Celiac disease."

When assessing the participants' knowledge regarding what product contains gluten, they were given a list to choose from. Figure 1 shows 76.8% of the participants chose bread, 69.5% chose cereals, and 18.94% chose "Nuts" and "Fruits" collectively.

In Figure 2, when describing how did the participants learn or know about the Gluten-Free Diet, 55.7% reported "Social Media" as their resource, followed by "Friends" and "Dietitians" with 32% and 28.1%, respectively.

Table 3 displays significant results, which include 70.2 % of males and 78.6% of females reporting that they don't follow a GFD currently (p-value= <0.001). Among the participants who reported following a GFD, the percentage of females was higher than those of males. "Health reasons" was the predominant response for the question "What was the reason behind using a Gluten-Free diet?" with 55.1% and 65.8% for males and females, respectively, followed by "Weight loss" and "My family follows a Gluten-free diet."

Table 1. Demographic characteristics of the study participants

	N	%
Gender		
Female	457	57.6%
Male	336	42.4%
Age		
18-30	405	51.1%
31-40	182	23%
41-50	131	16.5%
51-60	49	6.2%
>60	26	3.3%
Marital status		
Single	382	48.2%
Married	390	49.2%
Divorced	16	2%
Widowed	5	0.6%
Nationality		
Saudi	547	69%
Non-Saudi	246	31%
Region		
Northern region	39	4.9%
Southern region	106	13.4%
Central region	477	60.2%
Eastern region	59	7.4%
Western region	112	14.1%
Educational level		
High school - diploma	261	32.9%
Bachelor's Degree	424	53.5%
Graduate Degrees	261	013.6%

DISCUSSION

The present study aimed to evaluate the level of awareness of GFD among the public in Saudi Arabia. Among those surveyed, we found that more than half (58%) knew about gluten and GFD. However, following a GFD in this study for health reasons was more significant than that reported in a study conducted in Salvador among 1326 from the general public, wherein more than 50% did it for weight control¹⁴. Another study by James Madison University showed that GFD mainly used for other reasons like allergies, family history, and gastrointestinal upsets." In the current study, participants were more likely to know about the GFD from social media, followed by friends and dietitians¹⁵. While another study done in Canada showed that cookbooks, the internet, and print media were the major sources of knowledge about GFD¹⁶. Few of the participants who followed GFD were able to identify gluten-free products, while another study has shown that (30%) of celiac patients were able to recognize gluten-free products¹⁶. In this study, (40%) of the respondents knew what diseases are treated using GFD, and the majority were females. Similarly, participants in a Turkish study affirmed that GFD is used by celiac patients¹⁷.

Our results revealed that "Health reasons" was the predominant response for following a GFD. The GFD's anticipated health benefits also influence dietary choices. Even though the diet's advantages have yet to be shown in healthy people. A study published in 2018 indicated that Americans and Canadians, respectively, believe gluten-free products are healthier, more nutritious, and more beneficial (33% and 26%, respectively)¹. Furthermore, most patients encountered

Table 2. Gluten-free diet knowledge

		Male		Female		P- value
		N	%	N	%	
What is Gluten?	A protein in all carbohydrates	38	11.3%	47	10.3%	0.006
	A protein in wheat, rye, and barley	182	54.2%	279	61.1%	
	Something in wheat that is not good	30	8.9%	57	12.5%	
	I don't know	86	25.6%	74	16.2%	
Have you heard about a Gluten-free diet?	Yes	222	66.1%	388	84.9%	<0.001
	No	114	33.9%	69	15.1%	
What is the main purpose of a Gluten-free diet?	Disease management	106	31.5%	224	49.0%	<0.001
	Healthy lifestyle	125	37.2%	170	37.2%	
	Weight loss	27	8.0%	22	4.8%	
	I don't know	78	23.2%	41	9.0%	
What diseases are managed by a Gluten-free diet?	Wheat allergy	49	45.8%	127	56.7%	0.2
	Celiac Disease	52	48.6%	88	39.3%	
	Diabetes	1	0.9%	4	1.8%	
	I don't know	4	3.7%	5	2.2%	

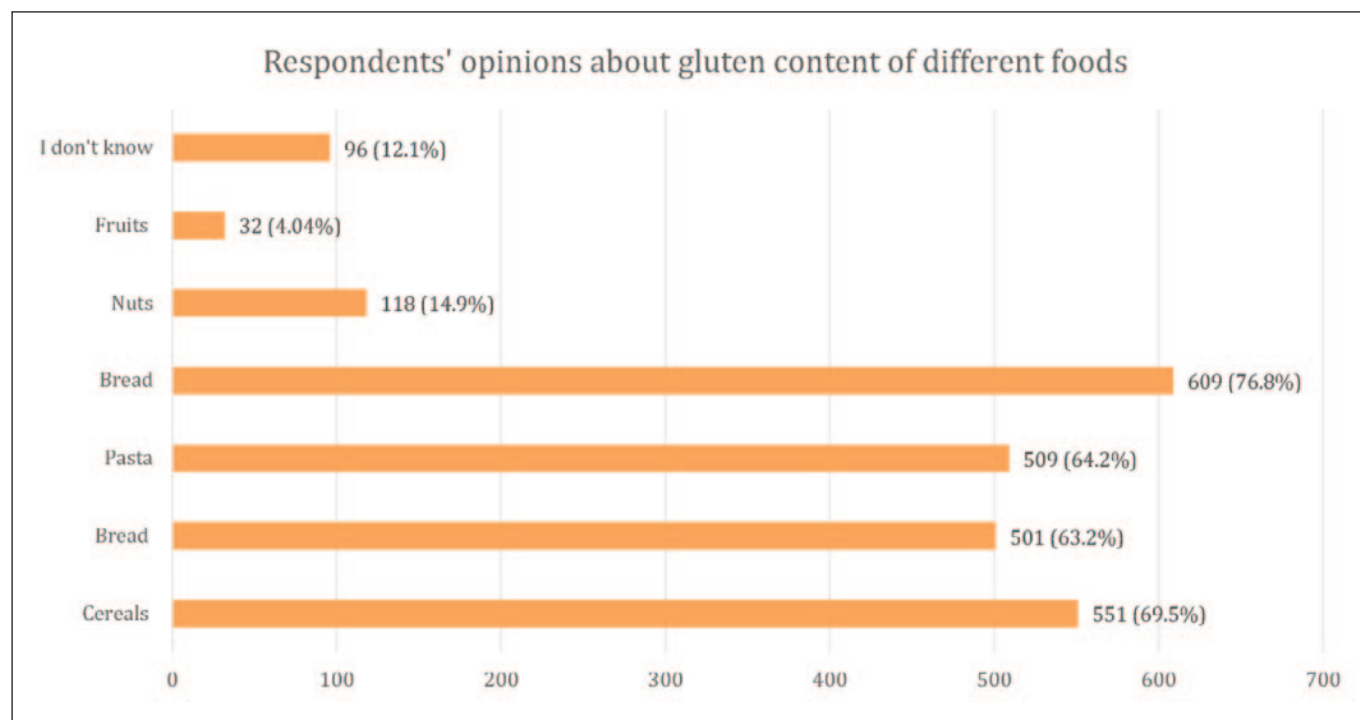


Figure 1. Identifying Gluten-containing Products

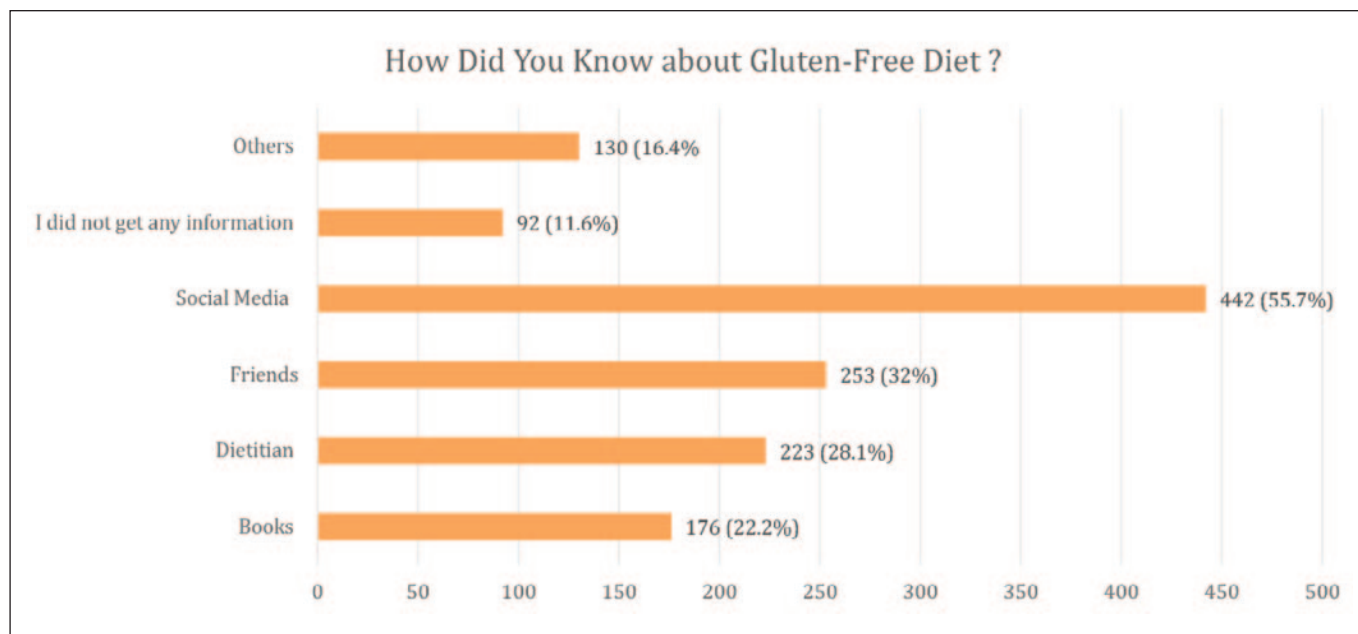


Figure 2. Sources of Gluten-Free Diet knowledge

Table 3. Prevalence of Gluten-free Diet

		Males		Females		P- value
		N	%	N	%	
Do you currently follow a gluten-free diet?	Yes, rigorously	12	3.6%	28	6.1%	<0.001
	Yes, with lapses	37	11.0%	45	9.8%	
	No, I don't follow a gluten-free diet	236	70.2%	359	78.6%	
	I don't know	51	15.2%	25	5.5%	
What was the reason behind using Gluten-Free diet?	Health reasons	27	55.1%	48	65.8%	0.005
	Weight-loss	12	24.5%	15	20.5%	
	My family follows a Gluten-free diet	10	20.4%	3	4.1%	
	I was told by a doctor	0	0.0%	7	9.6%	

difficulties finding gluten-free products in Saudi Arabia. A study has shown that half of the patients, 55%, said that gluten-free goods were not readily available in grocery stores. Travel, the unavailability of Arabic bread, and the dearth of gluten-free food options in restaurants were further obstacles to obtaining gluten-free items. Most CD patients (81%) not compliant with GFD were food insecure because of lack of money and other resources, while almost half of the patients (45%) compliant with GFD were food secure. Patients also mentioned that it was difficult to get affordable and high-quality gluten-free foods in KSA¹⁸.

Scientific studies on GFD knowledge among populations in different parts of the world are limited. The present findings indicate that more studies need to be conducted to increase awareness about GFD^{15,17}. A study done in Turkey by TAŞKIN and SAVLAK, demonstrated that the recognition of the relation between GFD and celiac disease was significantly high in women and postgraduates, which is similar to our findings. Among people diagnosed with gluten-related disorders, those with a medical diagnosis obtained higher knowledge scores and were more adherent to the diet than self-diagnosed individuals^{17,19}. Another study showed that

non-celiac people have less knowledge regarding many of the specifics of a GFD²⁰.

STUDY STRENGTHS AND LIMITATIONS

The sample size is relatively large. This topic is under-researched in Saudi Arabia, which makes this study novel. This study has many limitations. The cross-sectional nature of the study limits any causal inferences. The study used an online survey to collect the data, therefore, selection bias is highly likely. This study cannot be generalized to all Saudi residents because the majority were from the central region.t

CONCLUSION

More than half of the respondents were aware of a gluten-free diet, and the majority were females. Only a few respondents followed a gluten-free diet, and it was for health-related reasons. Social media was the primary source of impact on respondents' knowledge about a gluten-free diet. This study findings on public's awareness, and knowledge toward GFD can't be generalized, therefore other studies should be conducted to further understand the population.

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