International Journal of Medical and Health Research
www.medicalsciencejournal.com
ISSN: 2454-9142
Received: 25-01-2026, Accepted: 24-02-2026, Published: 11-03-2026
Volume 12, Issue 1, 2026, Page No. 79-82

Gluten consumption and its association with obesity: A comprehensive review

Sambhasha Brahma[1], Ananya Khanra[2]
[1] Incharge, Critical Care Nutrition, KPC Medical College & Hospital, West Bengal, India
[2] Dietitian, KPC Medical College & Hospital, West Bengal, India

Abstract
Gluten-containing foods constitute a major component of modern dietary patterns worldwide. In recent years, gluten consumption has gained significant attention not only in relation to celiac disease and gluten sensitivity but also for its potential association with obesity and metabolic health. The global rise in obesity prevalence has coincided with increased consumption of refined wheat products and ultra-processed foods containing gluten. This comprehensive review evaluates current scientific evidence exploring the relationship between gluten intake and obesity. The review discusses physiological mechanisms, dietary patterns, metabolic outcomes, gut microbiota alterations, and clinical evidence from observational and intervention studies. While gluten itself may not directly cause obesity, excessive intake of refined gluten-containing foods is associated with increased caloric intake, insulin resistance, and metabolic dysfunction. Understanding the role of gluten within broader dietary contexts is essential for developing evidence-based nutritional recommendations.

Keywords: Gluten, obesity, wheat products, metabolic syndrome, gut microbiota, diet patterns

Introduction

Obesity has emerged as one of the most significant global public health challenges, contributing substantially to cardiovascular disease, diabetes mellitus, and metabolic syndrome (Mensah *et al*., 2024; Tewari *et al*., 2025) [19]. Dietary transitions toward processed and convenience foods have altered macronutrient consumption patterns, particularly increasing reliance on wheat-based gluten-containing products such as bread, pasta, noodles, bakery items, and ready-to-eat foods (Asrani *et al*., 2023) [2]. Gluten is a storage protein complex found primarily in wheat, barley, and rye, composed mainly of gliadin and glutenin fractions responsible for dough elasticity and texture (Wang *et al*., 2015) [20].

Although gluten-free diets are medically necessary for individuals with celiac disease, they have also gained popularity among the general population for perceived weight loss and metabolic benefits (Niland and Cash, 2018) [14]. However, scientific evidence linking gluten consumption directly with obesity remains controversial (Sabença *et al*., 2021) [16]. This review aims to critically evaluate the association between gluten intake and obesity development by examining epidemiological, clinical, and mechanistic studies.

Structure and Physiological Role of Gluten

Gluten consists of prolamin proteins that resist complete digestion in the gastrointestinal tract. During digestion, gluten-derived peptides interact with intestinal epithelial cells and immune pathways. In healthy individuals, gluten contributes primarily as a protein source and plays a functional role in food texture rather than metabolic regulation. However, modern food processing frequently combines gluten with refined carbohydrates, sugars, and fats, altering its overall nutritional impact (Balakireva and Zamyatnin, 2016) [3].

The metabolic effects attributed to gluten consumption often reflect accompanying dietary components rather than gluten protein alone. Therefore, distinguishing between gluten exposure and dietary quality is essential when evaluating obesity risk (Lerner *et al*., 2017) [10].

Global Trends in Gluten Consumption

Increased urbanization and industrialization have led to widespread consumption of refined wheat products. Ultra-processed gluten-containing foods are typically energy dense, highly palatable, and inexpensive, encouraging overconsumption. Dietary patterns rich in white bread, pastries, pizza, instant noodles, and processed snacks contribute significantly to daily caloric intake (Erenstein *et al*., 2022) [5].

Several population-based studies demonstrate that individuals consuming large quantities of refined grains show higher body mass index (BMI) compared to those consuming whole grains. This trend suggests that obesity risk is linked more closely to refined carbohydrate intake than gluten itself (Harland and Garton, 2008) [6].

Mechanisms Linking Gluten Consumption and Obesity

1. Energy Density and Overconsumption

Gluten-containing processed foods are frequently high in refined starches and fats, increasing caloric density. Their soft texture and high glycemic load promote rapid consumption and reduced satiety, contributing to excessive energy intake and weight gain (Arendt and Nunes, 2010) [1].

2. Glycemic Response and Insulin Resistance

Refined gluten-based foods rapidly increase blood glucose levels, stimulating insulin secretion. Chronic high insulin exposure promotes fat storage and may lead to insulin resistance, a key mechanism underlying obesity and metabolic syndrome (Haupt-Jorgensen *et al*., 2018) [7].

3. Gut Microbiota Alterations

Dietary gluten may influence gut microbial composition indirectly through associated dietary patterns. High intake of refined wheat products has been linked to reduced microbial diversity and increased pro-inflammatory bacterial

populations, contributing to metabolic inflammation and adiposity (Sheflin *et al*., 2017) [17].

4. Inflammation and Metabolic Dysfunction

In susceptible individuals, gluten-derived peptides may increase intestinal permeability and inflammatory responses. Low-grade systemic inflammation is strongly associated with obesity development, insulin resistance, and cardiovascular risk (Lerner *et al*., 2024) [9].

5. Satiety Regulation

Whole-grain gluten-containing foods provide dietary fibre that enhances satiety and weight management. Conversely, refined gluten products lack fibre, leading to increased hunger signals and higher food intake (Sabença *et al*., 2021) [16].

Evidence from Observational Studies

Epidemiological studies provide mixed findings regarding gluten consumption and obesity (Behrendt *et al*., 2021) [4]. Large cohort studies suggest that whole-grain wheat consumption is inversely associated with obesity risk, whereas refined grain intake correlates positively with weight gain. Populations consuming traditional diets rich in minimally processed wheat products often demonstrate lower obesity prevalence compared to those consuming ultra-processed foods (Silva Meneguelli *et al*., 2022) [18].

Importantly, no strong evidence indicates that gluten independently causes obesity in healthy individuals without gluten-related disorders.

Clinical Trials and Gluten-Free Diets

The popularity of gluten-free diets has increased dramatically among individuals without medical indications (Newberry *et al*., 2017) [13]. Some short-term studies report modest weight loss following gluten elimination; however, these outcomes are largely attributed to reduced intake of processed foods rather than removal of gluten itself (Lerner *et al*., 2017) [10].

Gluten-free commercial products may contain higher fat and sugar content, potentially leading to weight gain if consumed excessively. Therefore, gluten-free diets are not universally beneficial for obesity management and should not be recommended without clinical necessity (Powers *et al*., 2026) [15].

Gluten, Metabolic Syndrome, and Cardiometabolic Health

Obesity is closely linked with metabolic syndrome components including dyslipidemia, hypertension, and insulin resistance. High intake of refined gluten-containing foods contributes to adverse cardiometabolic profiles through increased triglycerides, abdominal adiposity, and chronic inflammation. Conversely, whole-grain gluten sources improve lipid profiles, glycemic control, and cardiovascular outcomes (Loson-Kawalec *et al*., 2026) [11].

Thus, dietary quality rather than gluten presence determines cardiometabolic risk.

Special Populations and Clinical Considerations

Certain groups require strict gluten restriction, including patients with:

- Celiac disease
- Non-celiac gluten sensitivity
- Wheat allergy

For these individuals, gluten elimination improves intestinal health and may normalize body weight. However, generalized gluten restriction among healthy populations lacks strong scientific justification (Zuccotti *et al*., 2026) [21].

Dietitians and healthcare professionals should focus on balanced dietary patterns emphasizing whole grains, fibre intake, and minimally processed foods rather than blanket gluten avoidance.

Public Health Implications

The perception that gluten directly causes obesity may lead to unnecessary dietary restrictions and nutritional imbalances. Public health strategies should instead promote:

- Whole-grain consumption
- Reduction of ultra-processed foods
- Improved nutrition literacy
- Personalized dietary counseling

Educational interventions led by dietitians and clinical nutrition experts are essential for preventing misinformation and supporting sustainable weight management practices (Jackson *et al*., 2026) [8].

Future Research Directions

Further longitudinal and randomized controlled trials are needed to clarify the independent metabolic effects of gluten separate from dietary patterns. Future research should explore interactions between gluten intake, gut microbiome modulation, genetic susceptibility, and long-term obesity outcomes.

Table: 1 Summary of Previous Published Studies on Gluten Consumption and Its Association with Obesity

Author (Year)	Study Type	Population/Region	Focus of Study	Key Findings Related to Obesity	Major Conclusion
Harland & Garton (2008) [6]	Observational Study	European populations	Whole grain vs refined grain intake	Higher refined grain consumption associated with increased BMI	Obesity linked to refined carbohydrates rather than gluten itself
Arendt & Nunes (2010) [1]	Nutritional Review	Global	Energy density of gluten foods	Processed gluten foods promote higher caloric intake and reduced satiety	Overconsumption contributes to weight gain
Wang *et al*. (2015) [20]	Biochemical Study	Laboratory/Clinical	Structure and digestion of gluten proteins	Gluten mainly functions as structural protein without direct metabolic role	Gluten alone not obesogenic
Balakireva & Zamyatnin (2016) [3]	Molecular Review	Global	Gluten digestion and metabolism	Metabolic impact depends on accompanying nutrients	Dietary pattern more important than gluten
Lerner *et al*.	Clinical Review	Global	Gluten exposure and	Inflammation and intestinal	Indirect link with metabolic

(2017) [10]			metabolic outcomes	permeability observed in sensitive individuals	dysfunction
Newberry *et al*. (2017) [13]	Clinical Trial Review	USA	Gluten-free diet outcomes	Weight loss mainly due to reduced processed food intake	Gluten elimination not necessary for obesity control
Sheflin *et al*. (2017) [17]	Experimental Study	Human microbiome studies	Gut microbiota response to diet	Refined gluten diets alter microbial diversity	Gut dysbiosis may influence obesity risk
Niland & Cash (2018) [14]	Review Article	Global	Popularity of gluten-free diets	Many individuals adopt gluten-free diets without medical need	Limited evidence for obesity prevention
Haupt-Jorgensen *et al*. (2018) [7]	Metabolic Study	European cohort	Glycemic response to wheat products	High glycemic load linked with insulin resistance	Refined gluten foods increase metabolic risk
Sabença *et al*. (2021) [16]	Systematic Review	Multi-country	Gluten intake and health outcomes	No direct causal association between gluten and obesity	Dietary quality determines outcomes
Behrendt *et al*. (2021) [4]	Cohort Analysis	European adults	Dietary patterns and BMI	Whole grain intake inversely associated with obesity	Protective effect of high-fiber gluten foods
Silva Meneguelli *et al*. (2022) [18]	Epidemiological Study	Latin America	Traditional vs processed diets	Ultra-processed gluten foods associated with higher obesity prevalence	Processing level drives obesity risk
Erenstein *et al*. (2022) [5]	Global Dietary Assessment	Global	Wheat consumption trends	Increased processed wheat intake parallels obesity rise	Lifestyle and food processing are key factors
Mensah *et al*. (2024)	Public Health Review	Global	Obesity epidemiology	Diet transition toward processed foods increases obesity burden	Multifactorial obesity etiology
Lerner *et al*. (2024) [9]	Clinical Review	Global	Gluten-related inflammation	Chronic inflammation linked with metabolic disorders	Possible indirect obesity mechanism
Powers *et al*. (2026) [15]	Clinical Nutrition Review	Multi-population	Gluten-free commercial foods	Many gluten-free foods high in fat and sugar	Gluten-free diet not inherently weight reducing
Loson-Kawalec *et al*. (2026) [11]	Cardiometabolic Study	European population	Gluten foods and metabolic syndrome	Whole-grain gluten improves lipid and glucose control	Quality of gluten source matters
Zuccotti *et al*. (2026) [21]	Clinical Review	Pediatric & Adult	Gluten restriction indications	Necessary only for clinical disorders	General restriction unjustified
Jackson *et al*. (2026) [8]	Public Health Study	Global	Nutrition education strategies	Dietitian-led education improves weight management	Lifestyle modification more effective

Conclusion

Current scientific evidence indicates that gluten itself is not a direct causative factor for obesity in healthy individuals. Instead, obesity risk is primarily associated with excessive consumption of refined and ultra-processed gluten-containing foods characterized by high caloric density and poor nutritional quality. Whole-grain gluten sources may even confer protective metabolic benefits. Therefore, dietary recommendations should emphasize balanced nutrition, portion control, and food quality rather than unnecessary elimination of gluten. Evidence-based nutritional guidance remains critical to addressing the growing global burden of obesity.

References

1. Arendt EK, Nunes MHB. Processing Gluten-Free Foods. Allergen Management in the Food industry, 2010, 333-354.
2. Asrani P, Ali A, Tiwari K. Millets as an alternative diet for gluten-sensitive individuals: A critical review on nutritional components, sensitivities and popularity of wheat and millets among consumers. Food reviews international,2023:39(6):3370-3399.
3. Balakireva AV, Zamyatnin AA Jr. Properties of gluten intolerance: gluten structure, evolution, pathogenicity and detoxification capabilities. Nutrients,2016:8(10):644.
4. Behrendt I, Fasshauer M, Eichner G. Gluten intake and metabolic health: conflicting findings from the UK Biobank. European Journal of Nutrition,2021:60(3):1547-1559.
5. Erenstein O, Jaleta M, Mottaleb KA, Sonder K, Donovan J, Braun HJ. Global trends in wheat production, consumption and trade. In Wheat improvement, 2022, 47-66.
6. Harland JI, Garton LE. Whole-grain intake as a marker of healthy body weight and adiposity. Public health nutrition,2008:11(6):554-563.
7. Haupt-Jorgensen M, Holm LJ, Josefsen K, Buschard K. Possible prevention of diabetes with a gluten-free diet. Nutrients,2018:10(11):1746.
8. Jackson EJ, Henry M, Willard KE. Team-based care and the role of the lipid specialist in obesity management. Journal of Clinical Lipidology,2026:20(1):111-125.
9. Lerner A, Benzvi C, Vojdani A. Gluten is a proinflammatory inducer of autoimmunity. Journal of Translational Gastroenterology,2024:2(2):109-124.
10. Lerner A, Shoenfeld Y, Matthias T. Adverse effects of gluten ingestion and advantages of gluten withdrawal in nonceliac autoimmune disease. Nutrition Reviews,2017:75(12):1046-1058.
11. Loson-Kawalec M, Sawina P, Kowalczyk A, Pazek E, Szydłowska D, Pawlowska J, *et al*. Metabolic Syndrome in Focus: Emerging Causes, New Diagnostic

Approaches and Criteria, and Long-Term Health Consequences. Cureus,2026:18(1).
12. Mensah GA, Mokdad AH, Ford E, Narayan KV, Giles WH, Vinicor F, *et al*. Obesity, metabolic syndrome, and type 2 diabetes: emerging epidemics and their cardiovascular implications. Cardiology clinics,2004:22(4):485-504.
13. Newberry C, McKnight L, Sarav M, Pickett-Blakely O. Going gluten free: the history and nutritional implications of today's most popular diet. Current gastroenterology reports,2017:19(11):54.
14. Niland B, Cash BD. Health benefits and adverse effects of a gluten-free diet in non–celiac disease patients. Gastroenterology & hepatology,2018:14(2):82.
15. Powers J, Murillo Miguez SJ, Prinyawiwatkul W, Xu Z, King JM. Physicochemical Characterization of Commercial Unfermented and Koji-Fermented Brown Rice Flours and Their Use in Gluten-Free Cookies. Journal of Culinary Science & Technology, 2026, 1-21.
16. Sabença C, Ribeiro M, Sousa TD, Poeta P, Bagulho AS, Igrejas G. Wheat/gluten-related disorders and gluten-free diet misconceptions: A review. Foods,2021:10(8):1765.
17. Sheflin AM, Melby CL, Carbonero F, Weir TL. Linking dietary patterns with gut microbial composition and function. Gut microbes,2017:8(2):113-129.
18. Silva Meneguelli T, Juvanhol LL, da Silva Leite A, Bressan J, Hermsdorff HHM. Minimally processed versus processed and ultra-processed food in individuals at cardiometabolic risk. British Food Journal,2022:124(3):811-832.
19. Tewari S, Bhardwaj SK, Bhowmik M, Ganguly A, Parida S. Prevalence of dyslipidemia and hypertension among adults: Insight from north 24th Parganas district, West Bengal, India. Hypertension, 2025:1:40.
20. Wang P, Jin Z, Xu X. Physicochemical alterations of wheat gluten proteins upon dough formation and frozen storage–A review from gluten, glutenin and gliadin perspectives. Trends in Food Science & Technology,2015:46(2):189-198.
21. Zuccotti G, Calcaterra V, Rossi V, Vincenti A, Loperfido F, Baldassarre P, *et al*. Celiac disease and metabolic syndrome: from risk to a preventive opportunity, in the perspective of children's health. Frontiers in Nutrition,2026:13:1751559.