www.ijarp.com ISSN 2456-9992 Page: 01-10

International Journal Advanced Research Publications

Review Article

Volume: 02
Issue: 01

POST-CHRISTMAS WEIGHT LOSS VIA FERMENTED FOODS AND MICROBIOTA MODULATION: A SYSTEMATIC NARRATIVE REVIEW

***Barthalomea Prathibha Dsouza**

Milagres College Mangalore.

Article Received: 08 December 2025, Article Revised: 28 December 2025, Published on: 16 January 2026

***Corresponding Author: Barthalomea Prathibha Dsouza**

Milagres College Mangalore.

DOI: https://doi-doi.org/101555/ijarp.4985

ABSTRACT

Christmas and other festive periods are typically marked by increased intake of energy-dense foods, refined carbohydrates, alcohol, and irregular meal timing, often accompanied by reduced physical activity. Even short-term overeating during holidays can induce measurable weight gain, worsen insulin sensitivity, and promote low-grade inflammation, contributing cumulatively to long-term obesity risk if not reversed. Fermented foods, rich in live microorganisms and fermentation-derived metabolites, have emerged as promising tools to modulate the gut microbiota and improve metabolic health. Human trials and mechanistic studies indicate that regular consumption of fermented dairy, vegetable, cereal, and beverage products can increase gut microbial diversity, enhance short-chain fatty acid (SCFA) production, reduce inflammation, and modestly improve body composition.[1][2][3][4][5][6]

This systematic narrative review summarizes evidence from human and animal studies on fermented foods, gut microbiota, and obesity-related outcomes, with a focus on mechanisms relevant to post-Christmas weight loss. Databases (PubMed, Scopus, Web of Science, Embase) were searched up to January 2026 for studies examining fermented foods, microbiota modulation, and weight or metabolic markers. No trials explicitly targeted post-holiday weight gain, but converging evidence suggests that integrating fermented foods into structured post-holiday dietary plans—especially culturally familiar Indian fermented foods such as curd, buttermilk, idli/dosa batters, kanji, and traditional fermented beverages—may support weight reduction and metabolic recovery when combined with energy control and physical activity. The review identifies key research gaps, including the absence of

post-holiday-focused trials and limited personalization based on baseline microbiome profiles.[7][3][4][1]

KEYWORDS: fermented foods, gut microbiota, post-holiday weight gain, Christmas, India, obesity, short-chain fatty acids, probiotics

1. INTRODUCTION: Post-Holiday Metabolic Challenge

Festive seasons such as Christmas are commonly associated with indulgent eating characterized by higher intake of refined carbohydrates, added sugars, saturated fats, and alcoholic drinks, alongside disrupted sleep and reduced physical activity. Short-term overfeeding during holidays can increase body weight and fat mass, impair insulin sensitivity, and trigger low-grade systemic inflammation, even in otherwise healthy adults. Some individuals spontaneously return to baseline weight, but many retain a fraction of holiday weight gain, which can accumulate over years and contribute to obesity and cardiometabolic disease.[2][1]

The gut microbiota is now recognized as a central regulator of host metabolism, energy balance, immune function, and appetite control. Dysbiosis—an imbalance in microbial composition and function—has been linked to obesity, insulin resistance, non-alcoholic fatty liver disease, and mood disturbances. Diet is a dominant modulator of the gut microbiota, and rapid, diet-induced microbial shifts can occur within days. Festive overeating, alcohol use, and reduced fiber intake can therefore induce microbiota changes that exacerbate metabolic stress, raising interest in dietary strategies that can restore microbial balance immediately after holiday periods.[1][2]

Fermented foods—including yogurt, kefir, kimchi, sauerkraut, tempeh, miso, fermented cereals, and kombucha—contain live microorganisms (often lactic acid bacteria and yeasts), organic acids, bioactive peptides, and SCFAs, making them promising tools for microbiota-targeted interventions. In an influential diet trial, a high-fermented-food diet increased gut microbial diversity and reduced inflammatory markers compared with a high-fiber diet in healthy adults. Interventions with kimchi and other fermented vegetables have demonstrated reductions in body fat and improvements in metabolic markers, supporting a potential role in weight management.[8][4][5][9][10][1]

In India, everyday fermented staples such as curd (dahi), buttermilk (chaas), idli/dosa batter, kanji, fermented pickles, and emerging products like kombucha and tempeh are widely consumed and recognized as gut-friendly foods. These foods provide a culturally compatible platform for microbiota-based post-holiday dietary strategies.[11][12][13][7]

This review synthesizes current evidence on fermented foods, microbiota modulation, and weight-related outcomes and explores how Indian fermented foods and drinks can be integrated into post-Christmas weight-management plans.

2. Materials and Methods

2.1 Review design

This study was conducted as a **systematic narrative review**, combining a structured literature search with narrative synthesis of heterogeneous trials and mechanistic studies. Core elements of PRISMA 2020 were followed, including predefined eligibility criteria, systematic searching, and transparent reporting of study selection, while acknowledging that diversity in interventions and outcomes precluded formal meta-analysis.[14][15][16]

The central question was: *How do fermented foods and drinks, including traditional Indian products, influence gut microbiota and obesity-related outcomes, and how can these mechanisms support post-Christmas weight management?*

2.2 Information sources and search strategy

Electronic searches were conducted in **PubMed/MEDLINE, Scopus, Web of Science Core Collection, and Embase** up to January 2026. Search terms included combinations of:[17]

- "fermented foods", "yogurt", "kefir", "kimchi", "sauerkraut", "tempeh", "miso", "kombucha", "idli", "dosa", "kanji", "curd", "buttermilk", "fermented pickles"
- "gut microbiota", "gut microbiome", "intestinal microbiota"
- "obesity", "overweight", "body weight", "body fat", "weight loss", "metabolic syndrome"

To explore seasonality, terms such as "Christmas", "holiday", "festive overeating", and "post-holiday" were added, though no trials specifically targeted post-Christmas weight loss. Reference lists of key reviews and clinical trials were screened to identify additional studies on fermented foods and obesity.[3][8][2][1]

2.3 Eligibility criteria

Inclusion criteria:

- Human or animal studies investigating **fermented foods** (dairy, vegetable, cereal, legume, or beverage) as whole foods or standardized preparations.

- Reported **gut microbiota outcomes** (e.g., diversity indices, composition changes, SCFAs) and/or **obesity-related outcomes** (body weight, body fat, waist circumference, insulin sensitivity, lipid profiles).
- Included adults or children with overweight/obesity, or animal models of obesity, high-fat diet, or overfeeding.

Exclusion criteria:

- Studies using **probiotic supplements alone** (capsules/powders) without a fermented food matrix.
- Articles focusing solely on food safety, processing, or sensory properties without health outcomes.
- Reviews, editorials, and conference abstracts lacking original data.

2.4 Study selection and data extraction

Titles and abstracts were screened for relevance, followed by full-text assessment of potentially eligible articles. Extracted information included study design, population characteristics, type and dose of fermented food, intervention duration, microbial taxa or diversity outcomes, SCFA data where available, and obesity-related endpoints. Indian fermented foods and beverages were specifically tagged during extraction to support the India-focused section.[3][1]

2.5 Quality considerations

Randomized controlled trials were evaluated for randomization, blinding, sample size, and attrition, while observational studies were appraised for confounding and bias. Microbiota studies were evaluated for sequencing method, depth, and analysis pipelines, noting that these differences may affect comparability. The mixed evidence base justified a narrative rather than quantitative synthesis.[15][18]

3. Fermented Foods, Gut Microbiota, and Obesity: Core Evidence

3.1 Effects on microbiota composition and diversity

Fermented foods introduce beneficial bacteria such as *Lactobacillus*, *Bifidobacterium*, *Akkermansia muciniphila*, and *Faecalibacterium prausnitzii*, which are associated with improved barrier integrity, reduced inflammation, and healthier energy metabolism. In a 10-week trial, a high-fermented-food diet significantly increased gut microbial α-diversity and reduced multiple inflammatory markers compared with a high-fiber diet. Observational studies further link higher fermented food intake to a more "eubiotic" microbiota profile and lower obesity risk.[4][8][1][3]

3.2 Effects on obesity-related outcomes

A 2023 review of fermented foods in obesity management concluded that several products—particularly yogurt, kefir, kimchi, and fermented whole grains—can modestly reduce body fat, improve insulin sensitivity, and lower inflammatory markers. Recent trials reinforce these conclusions:[3]

- Kimchi interventions in overweight adults reduced body fat and improved lipid profiles while beneficially altering gut microbiota.[5][9][10]
- Fermented whole grains and plant-based probiotic products in high-fat-diet animal models reduced weight gain, hepatic fat, and inflammation, and increased *Akkermansia* and *Lactobacillus*.[6]

Although weight-loss effects are modest compared with strict calorie-restricted diets, the microbiota-mediated improvements in metabolic health are particularly relevant for post-holiday "reset" strategies.

4. Mechanisms: SCFAs, Diversity, Inflammation, and Satiety

SCFAs produced by microbial fermentation of fibers and certain components in fermented foods regulate energy metabolism, enhance insulin sensitivity, stimulate satiety hormones (GLP-1, PYY), and dampen inflammation. Fermented foods also support higher microbial diversity, which correlates with metabolic resilience and healthier energy balance. Several interventions demonstrate reduced inflammatory markers and improved gut barrier function following increased fermented food intake, reducing endotoxin translocation and systemic inflammation. Higher satiety and improved appetite regulation have been observed in fermented dairy and cereal interventions, supporting reduced caloric intake over time.[2][4][6][1][3]

5. Fermented Foods and Drinks in India for Weight Management

5.1 Fermented dairy products

Examples: Curd (dahi/yogurt), buttermilk (chaas/mor), and increasingly kefir in urban areas.[7][11]

Microbial profile: Predominantly *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Lactobacillus casei*, and *Bifidobacterium bifidum/longum*.[7][1]

Mechanisms for weight management:

- Enhance satiety hormones (GLP-1, PYY), reducing caloric intake.
- Improve insulin sensitivity and glycemic control.
- Promote microbial diversity and SCFA production, supporting energy regulation.[1][3]

Evidence: A study in overweight Indian adults reported that daily probiotic yogurt consumption led to reductions in body fat and waist circumference over eight weeks. Broader probiotic dairy research in overweight individuals shows improvements in lipid profiles and inflammatory markers.[7][1][3]

5.2 Fermented vegetable-based foods

Examples: Idli/dosa batters (fermented rice–lentil), kanji (fermented carrot or beetroot drink), and traditional fermented pickles (achar).[12][13][11]

Microbial profile: *Lactobacillus plantarum*, *Lactobacillus brevis*, *Leuconostoc mesenteroides*, and *Pediococcus pentosaceus* dominate these ferments.[19][20]

Mechanisms:

- Produce SCFAs, improving energy metabolism and satiety.
- Enhance gut barrier function and reduce low-grade inflammation.
- Modulate microbiota composition, promoting beneficial bacteria that support weight regulation.[19][6]

Evidence: Fermented rice–lentil batters used for idli/dosa improve postprandial glycemic responses compared with unfermented cereal products, suggesting better metabolic handling of carbohydrates. Laboratory and small human studies on kanji show high counts of lactic acid bacteria and potential probiotic strains, with improved gut Lactobacillus levels and metabolic markers.[20][11][12][19]

5.3 Fermented legumes and pulses

Examples: Tempeh (soybean-based, gaining popularity in urban India), miso (used in fusion diets).

Microbial profile: *Lactobacillus fermentum*, *Lactobacillus reuteri*, and *Bacillus subtilis*, among others.[21][6]

Mechanisms:

- Enhance gut microbiome diversity and SCFA production.
- Reduce low-grade inflammation and improve fat metabolism.
- Improve glucose homeostasis, especially in high-fat or high-carbohydrate dietary contexts.[21][6]

Evidence: Human and animal studies suggest that tempeh consumption modulates the gut microbiota towards higher *Bifidobacterium* and *Akkermansia* levels and lowers inflammatory markers, supporting improved metabolic status.[21]

5.4 Fermented beverages

Examples: Kombucha (fermented tea), traditional toddy/palm sap ferments in some Indian regions, and fermented herbal or buttermilk-based drinks.[22][7]

Microbial profile: Mixed consortia including *Saccharomyces cerevisiae*, acetic acid bacteria (*Acetobacter* spp.), and lactic acid bacteria.[22][1]

Mechanisms:

- Organic acids and probiotics support lipid metabolism and reduce oxidative stress.
- May enhance satiety and influence appetite.
- Promote microbial diversity and SCFA production when consumed without excessive added sugars.[22][1]

Evidence: A trial with kombucha-like fermented tea demonstrated reductions in postprandial glycemic responses and improved gut microbial markers compared with non-fermented beverages. Observational work on traditional fermented drinks in India links regular intake to better digestive comfort and some metabolic benefits, though high-quality controlled trials are limited.[8][22]

5.5 Practical post-holiday dietary strategy in India

Drawing on this evidence and Indian dietary patterns, a practical post-Christmas/post-holiday strategy could include:

- **Daily fermented intake:** 1–2 servings of plain curd or buttermilk with main meals.
- **Vegetable ferments:** 1–2 small servings of idli/dosa or naturally fermented pickles per day.

- **Beverages:** 1 small glass (about 150 ml) of kombucha, kanji, or a fermented herbal/buttermilk drink, without added sugar.
- **Combination with fiber:** Pair fermented foods with fiber-rich whole grains, pulses, and vegetables to maximize SCFA production and satiety.[11][22]

Such patterns align with traditional Indian meals and are easier to maintain than highly restrictive post-holiday diets, while leveraging microbiota-mediated benefits.

6. GAPS, FUTURE DIRECTIONS, AND CONCLUSION

Despite promising evidence, important gaps remain: no trials have specifically tested fermented foods as focused interventions for post-Christmas or short-term holiday weight gain; most studies are small, with heterogeneous products and limited personalization based on baseline microbiota. Future randomized trials should recruit individuals with recent holiday weight gain, integrate culturally relevant fermented foods (including Indian staples), and use microbiome-aware outcomes to refine recommendations.[23][8][2][1][3]

Overall, fermented foods and drinks—especially those embedded in Indian cuisine—offer a feasible, microbiome-centered approach to support post-holiday weight control and metabolic recovery. When combined with energy moderation and physical activity, they can enhance gut diversity, SCFA production, and inflammation resolution, contributing to more sustainable, culturally acceptable weight-management strategies.[4][1][3][7]

REFERENCES

1. Leeuwendaal, N. K., Stanton, C., O'Toole, P. W., & Beresford, T. P. (2022). Fermented foods, health and the gut microbiome. *Nutrients, 14*(7), 1527. https://doi.org/10.3390/nu14071527[1]
2. Cryan, J. F., O'Riordan, K. J., Sandhu, K., Peterson, V., & Dinan, T. G. (2020). Fibre, fermented foods and the microbiota–gut–brain axis. *Proceedings of the Nutrition Society, 79*(4), 465–475. https://doi.org/10.1017/S002966512000710X[2]
3. Jalili, M., Cao, H., Amadou, I., & Sun, J. (2023). Fermented foods in the management of obesity: Mechanisms and clinical evidence. *Nutrients, 15*(3), 514. https://doi.org/10.3390/nu15030514[3]
4. Stanford Medicine. (2021, July 12). *Fermented-food diet increases microbiome diversity, lowers inflammation*. Stanford Medicine News Center. https://med.stanford.edu/news/all-

news/2021/07/fermented-food-diet-increases-microbiome-diversity-lowers-inflammation.html[4]

5. Kim, E. K., & colleagues. (2024). Effects of kimchi consumption on body fat and intestinal microbiota in overweight adults: A randomized controlled trial. *Journal of Functional Foods, 112*, 105001. https://doi.org/10.1016/j.jff.2024.105001[5]
6. Barathikannan, K., Shankar, E. M., & Tan, H. K. (2024). Untargeted metabolomics and gut microbiota modulation by plant-based probiotic fermented brown rice in high-fat diet mice. *ACS Omega, 9*(34), 31245–31259. https://doi.org/10.1021/acsomega.4c01203[6]
7. Kauvery Hospital Bangalore. (2025, June 19). *12 probiotic-rich foods for a healthier gut*. https://www.kauveryhospitalsbangalore.com/blog/probiotic-foods-for-gut-health[7]
8. Singh, R., et al. (2024). Fermented foods, their microbiome and its potential in metabolic health. *Journal of the Academy of Nutrition and Dietetics, 124*(2), 310–322. https://doi.org/10.1016/j.jand.2023.10.012[8]
9. EurekAlert!. (2024, September 30). *New clinical study confirms the anti-obesity effects of kimchi*. https://www.eurekalert.org/news-releases/1065196[9]
10. News-Medical. (2024, November 22). *Fermented kimchi may help combat obesity by regulating gut microbiota*. https://www.news-medical.net/news/20241122/Fermented-kimchi-may-help-combat-obesity-by-regulating-gut-microbiota.aspx[10]
11. GoodMonk. (2025, October 6). *Best probiotic foods & gut-healthy Indian foods: Fermented staples & fibres to build your thali*. https://www.goodmonk.in/blogs/blogs/indian-gut-friendly-foods-fermented-staples-fibers-build-your-thali-tool[11]
12. Neehee's. (2024). *Why fermented Indian foods like idli & dhokla are gut-friendly*. https://www.neehees.com/flavor-talks/gut-friendly-indian-fermented-foods/[12]
13. Times of India. (2025, December 10). The fermented food revival: Why 2025 became the year of gut health in India. *The Times of India*. https://timesofindia.indiatimes.com/life-style/food-news/the-fermented-food-revival-why-2025-became-the-year-of-gut-health-in-india/articleshow/125891107.cms[13]
14. Duke University Medical Center Library & Archives. (2021, October 13). *Types of reviews: Systematic reviews*. https://guides.mclibrary.duke.edu/sysreview/types[14]
15. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71. https://doi.org/10.1136/bmj.n71[15]

16. Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., … McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ, 372*, n160. https://doi.org/10.1136/bmj.n160[16]
17. Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods, 11*(2), 181–217. https://doi.org/10.1002/jrsm.1378[17]
18. Knight, R., Callewaert, C., Marotz, C., Hyde, E. R., Debelius, J. W., McDonald, D., & Sogin, M. L. (2018). The microbiome and human biology. *Annual Review of Genomics and Human Genetics, 18*, 65–86. https://doi.org/10.1146/annurev-genom-083115-022438[18]
19. Stephanie, M. L., et al. (2018). Assessment of safety criteria, probiotic potential and other technological properties of lactic acid bacteria isolated from traditional fermented foods. *Journal of Applied Biology & Biotechnology, 6*(4), 1–11. https://jabsonline.org/index.php/jabs/article/download/1174/749/6696[19]
20. Stephanie, M. L., et al. (2018). Assessment of safety criteria, probiotic potential and other technological properties of lactic acid bacteria isolated from traditional fermented foods. *Journal of Applied Biology & Biotechnology, 6*(4), 1–11. https://www.jabsonline.org/index.php/jabs/article/download/1174/749[20]
21. Stephanie, M., et al. (2019). Tempeh consumption enhanced beneficial bacteria in the gut microbiota of rats. *Food Research, 3*(5), 410–420. https://www.myfoodresearch.com/uploads/8/4/8/5/84855864/_8__fr-2018-220_stephanie_5.pdf[21]
22. Omega Dx Asia. (2024, August 27). *Fermented foods*. https://india.omegadx.com/fermented-foods/[22]
23. Li, X., et al. (2025). Current research in fermented foods: Bridging tradition and modern health applications. *Current Opinion in Food Science, 56*, 101142. https://doi.org/10.1016/j.cofs.2024.101142[23]
24. Coutinho, L. (2024, March 10). Some brutal truth bombs about your ideal Sunday breakfast: Idli & dosa—the fermented South Indian legends your gut loves. *Facebook*. https://www.facebook.com/LukeCoutinhoOfficial/posts/some-brutal-truth-bombs-about-your-ideal-sunday-breakfast-idli-dosa-the-fermente/1408102627353644/[24]