
# Dietary benefits of fermented foods

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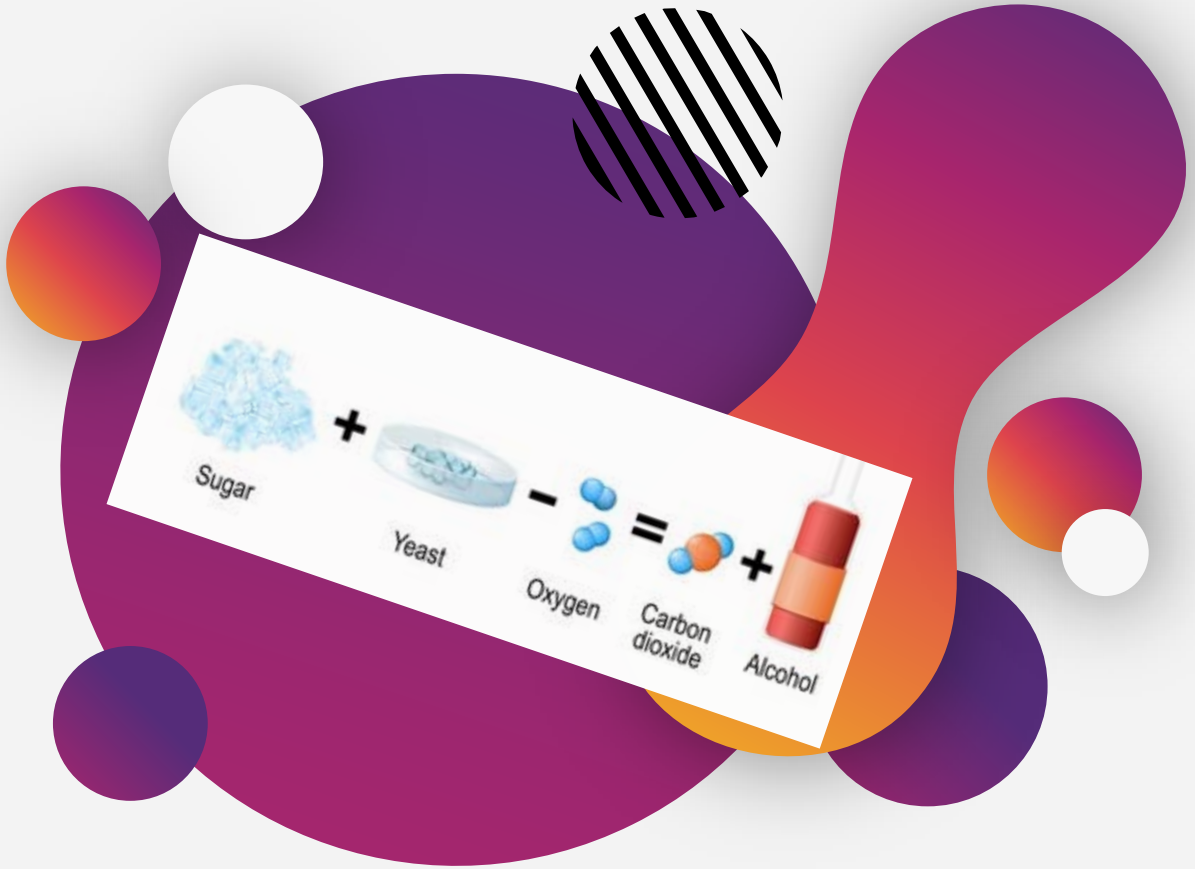
# Fermentation

- Ancient method of preserving food.
- Anaerobic breakdown of sugars.
- Degradation of carbohydrates under anaerobic - aerobic conditions.



# Fermented foods

- made up of carbs and sugars
- have been treated to the action of microorganisms
- include more probiotics, enzymes, and vitamins than non-fermented

# Main Fermented food categories

- Fermented Dairy
- Fermented Sausages
- Fermented Vegetables
- Fermented Fruit Juices and spirits
- Fermented Cereals

# FERMENTED GREEK PRODUCTS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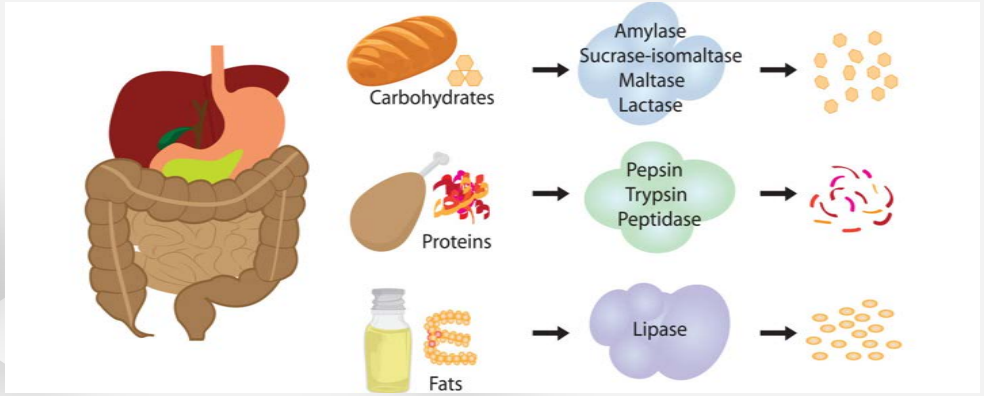
# General Advantages of Fermented Foods

- Great microbiological safety and shelf life
- Superior quality of taste, aroma, texture
- Higher nutritional value
- Beneficial actions for health

# Nutritional value of fermented food

Fermented foods have the ability to boost gastrointestinal system performance.

This improvement is attributed to fermented foods' capacity to boost the amount of beneficial bacteria in the stomach. These bacteria can digest food, fight off dangerous bacteria, and alleviate constipation and diarrhea symptoms.




# Impact on metabolism

-potential impact on the **metabolism of nutrients in the small intestine**, including lactose digestion, lipid metabolism, such as cholesterol metabolism

-contribute to the **metabolism of otherwise indigestible dietary carbohydrates**

- beneficial effect on the **metabolism of colon protein and ammonia**

-affect the **metabolism in the host tissues**, especially in the gastrointestinal tract mucosa and liver.

# Impact on WEIGHT

Large cohort investigations have revealed **strong associations between consumption of fermented dairy foods and weight maintenance** possibly through the improved glucose metabolism

# Nutritional value of fermented food

Production of vitamins and amino acids from the microorganisms of the fermentation

Enzymatic breakdown of proteins and carbohydrates in more easily digestible forms

Absence of heat treatment keeps unchanged the heat-sensitive vitamins, amino acids or fatty acids.

Reduced risk of contamination

# Nutritional value of fermented food

- removal of toxic or undesirable food constituents

-certain secreted proteins and exopolysaccharides produced during food fermentations might serve as anti-oxidants

-polysaccharides also act as prebiotics

# Survey evidence


Folic acid

Vitamin B12

Vitamin K2

Thiamine

Viotin

**Calcium intake** specifically associated with fermented foods is inversely and significantly correlated with periodontitis, while calcium from other dairy foods was not.

Decrease of serum cholesterol

The proteolysis that occurs in fermented milk results in a **higher content of peptides and free amino acids**, especially cystine, histidine, and asparagine

Sustainable yogurt starter crops have the potential to improve lactose digestion and to eliminate the symptoms of intolerance




**Table 1.** The compounds released from the fermented milk and milk products during fermentation and their health benefits (Fernández et al. 2015; Linares et al. 2017).

| Microorganism involved in fermentation | End products which affected by fermentation and their health benefits |
|---|---|
| *Lactobacillus spp.* | → increase the levels of some organic acid such as propionic, lactic, acetic, orotic and citric acid (Urbienė and Leskauskaitė 2006; Penna et al. 2015) and produces lipolytic, glycolytic and proteolytic enzymes (Penna et al. 2015). |
| *Propionibacterium spp.* | → exhibit $\beta$-Galactosidase (lactase) activity and attenuates lactose intolerance symptoms (Parvez et al. 2006; Saqib et al. 2017). |
| *Bifidobacterium spp.* | → exhibit lipolytic and proteolytic activities and produces free amino and fatty acids (Nespolo and Brandelli 2010).<br>→ exhibit better plasma lipid profile and cholesterol lowering activity by binding cholesterol and triglycerides in the small intestine (Banjoko et al. 2012; Chang et al. 2015). In addition, propionic acid exhibits hypocholesterolemic effect (Bourrie, Willing, and Cotter 2016)<br>→ produce lactic acid and thus facilitates lactose digestion and treatment diarrhea (Drouault and Corthier 2001)<br>→ show antimicrobial activity (Macuamule et al. 2016) by neutralizing toxins of pathogens and spoilage microorganism (Widyastuti and Febrisiantosa 2014) and by producing antimicrobial peptides (Mariam 2009). In addition, lactic acids exhibits antimicrobial activity by inhibiting the growth of pathogens and spoilage microorganism (Ao et al. 2012).<br>→ modulate the immune system (Chang et al. 2015).<br>→ maintain normal blood insulin levels (Masood et al. 2011). |
| *Lactobacillus spp.*<br>*Bifidobacterium spp.*<br>*Propionibacterium sp.*<br>*Streptococcus sp.* | → have the ability to synthesize water soluble vitamins such as thiamine (B1), riboflavin (B2), biotin (B7), cobalamin (B12), folic acids (B9) and enhance these vitamin content (LeBlanc et al. 2011; Capozzi et al. 2012; Patel et al. 2013). |
| *Lactobacillus spp.*<br>*Streptococcus spp.* | → synthesis GABA($\gamma$-aminobutyric acid) and thus exhibits GABA's health effects such as anti-hypertensive (Kajimoto et al. 2004), anti-depressant (Wu and Shah 2016), diuretic (Li & Cao 2010), tranquilizer (Gobbetti, Cagno, and De Angelis 2010), anti-diabetic (Li et al. 2010) and main inhibitory neurotransmitter effect (Dhakal, Bajpai, and Baek 2012). |
| *Lactobacillus spp.*<br>*Streptococcus sp.*<br>*Bifidobacterium sp.*<br>*Lactococcus spp.* | → synthesis bioactive peptides and these peptides exhibits health effect such as antihypertensive, anti-microbial, anti-thrombotic, opioid, mineral binding, anti-oxidative and immunumodulatory activities (Ferreira et al. 2007; Jakälä and Vapaatalo 2010; Wakai and Yamamoto 2012; Shori and Baba 2015; Beltrán-Barrientos et al. 2016). |
| *Lactobacillus spp.*<br>*Pediococcus sp.*<br>*Enterococcus sp.*<br>*Streptococcus sp.*<br>*Bifidobacterium sp.* | → synthesis of bacteriocins producing peptides and these peptides exhibits health effect such as bactericidal (Batdorj et al. 2006; Nespolo and Brandelli 2010) and anti-microbial activity (Abbasiliasi et al. 2012) by the inhibiting cell wall biosynthesis of pathogenic microorganism (C Borresen et al. 2012) and by binding cell surface receptors (Todorov 2008). |
| *Lactococcus sp.*<br>*Lactobacillus spp.*<br>*Streptococcus spp.*<br>*Bifidobacterium sp.* | → synthesis conjugated linoleic acid (CLA) and CLA shows anti-carcinogenic (Larsson, Bergkvist, and Wolk 2005; Gutierrez 2016), anti-atherosclerosis, anti-inflammatory activities (Van Nieuwenhove et al. 2007), anti-diabetic, anti-osteoporosis activities (Kuhl and De Dea Lindner 2016), anti-adipogenic and hypotensive activities (Liu et al. 2011; Song et al. 2016). |
| *Lactobacillus spp.*<br>*Propionibacterium sp.*<br>*Lactococcus sp.*<br>*Bifidobacterium sp.*<br>*Streptococcus spp.* | → synthesis exopolysaccharides (EPS) and EPS improves the DNA repair, protect against UV-induced carcinogenesis (Morifuji et al. 2017), exhibit anti-tumor, anti-bacterial (Enikeev 2012), gastroprotective (Rodriguez et al. 2009), antioxidant, anti-microbial properties (Prado et al. 2015) and immunumodulatory functions (Patel, Majumder and Goyal 2012), alleviate influenza virus-induced infections (Nishimura et al. 2013). |

# Thank you!