GOAT MILK HYDROLYSATE: EXPLORING THEIR POTENTIAL HEALTH BENEFITS

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ABSTRACT

Obesity and its associated metabolic disorders have emerged as major global health challenges, affecting millions of individuals across all age groups and socioeconomic backgrounds. India, now the most populous country, is projected to have the second-largest population of overweight and obese adults, placing significant strain on its healthcare system. Obesity increases the risk of numerous chronic conditions, including heart disease, type 2 diabetes, respiratory problems, and joint disorders. Goat milk is among the most widely consumed dairy products globally, with nearly three-quarters of the world's population consuming it. In many regions, people prefer goat milk over cow milk due to its richer, creamier texture and higher nutritional content. It is also easier to digest and carries a lower risk of triggering milk allergies. Goat milk hydrolysate contains bioactive peptides that offer various health benefits. These peptides can help regulate metabolism, reduce fat absorption, and improve insulin sensitivity. Additionally, they possess antioxidant and anti-inflammatory properties, and they play a role in modulating gut microbiota and regulating appetite. As a result, goat milk hydrolysate presents promising potential as a dietary intervention for managing obesity.

KEYWORDS: Obesity, goat milk, milk hydrolysate.

INTRODUCTION

Obesity is characterized by an excessive accumulation of body fat that may result in significant health complications. Obesity in adults is characterized by a body mass index (BMI) of 30 or higher (WHO, 2022). In 2022, roughly 16% of the worldwide adult population aged 18 and older was categorized as obese. In 1990, merely 2% of children and adolescents aged 5–19 year were classified as obese. By 2022, this ratio increased to 8%, impacting 160 million young individuals worldwide. Recent research indicates that the increasing prevalence of overweight and obesity would result in over 60% of adults and over one-third of children and adolescents being classified as overweight or obese by 2050. This data is really worrying for our nation since we have become the most populous country. The survey forecasts that by 2050, India would possess the second greatest population of adults with overweight or obesity, following China. This may impose a considerable strain on our healthcare system, potentially resulting in inefficiencies.

FACTORS AFFECTING OBESITY

A number of factors contribute to obesity. It includes

1.Genetic susceptibility to obesity

Parental obesity is the strongest risk factor for obesity, especially when both parents are obese, with maternal BMI showing a slightly stronger link, likely due to intrauterine or genetic factors.

2. Environmental Factors

Long-term changes in energy consumption and usage, including a significant contribution from increasing calorie intake and decreased physical activity, are associated to the growth in obesity.

3. Gut Microbiota

The gut microbiome has a significant impact on obesity and energy balance. An obese person's

microbiome is better able to obtain energy from their food, which leads to more fat being deposited. Introduction of obese individual microbiota to non-obese individual has significantly increased their body fat compared to lean microbiota.

4. High fat diet

High-fat diets lead to obesity characterized by hyperphagia, elevated lipids, enhanced fat metabolism in muscles, and increased hypothalamic galanin (GAL) expression. The increased hypothalamic GAL expression will increase GAL peptides in brain which will further increase appetite, especially for high fat food. Moderate-fat diets show similar but less pronounced traits. High-carbohydrate diets in contrast, result in obesity with a distinct metabolic profile favouring carbohydrate oxidation in muscles, without hyperphagia or lipid elevation.

5. Lack of physical activity

The promoting of active lifestyles for effective weight management and overall health improvement is very important. While direct evidence linking inactivity to obesity prevention is limited, encouraging physical activity can tackle chronic diseases.

CONSEQUENCES OF OBESITY

Obesity in both children and adults elevates the risk for several health issues.

- High blood pressure and high cholesterol which are risk factors for heart disease.
- Type 2 diabetes.
- Breathing problems, such as asthma and sleep apnea.
- Joint problems such as osteoarthritis and musculoskeletal discomfort.
- Gallstones and gallbladder disease.

GOAT MILK HYDROLYSATE AGAINST OBESITY

High protein intake helps reduce body weight and preserve muscle mass in low- and standard-calorie diets. Therefore, increasing protein intake may be important for maintaining healthy body weight and preserving muscle mass in obese individuals (1). Goat milk has a unique nutritional profile and health benefits. It contains higher levels of essential nutrients like calcium, phosphorus, and magnesium compared to cow and human milk making it valuable for addressing dietary deficiencies. Goat milk is easier to digest due to its smaller fat globule size and due to its unique protein composition, it is suitable for individuals with cow milk allergies or malabsorption issues.

Goat milk hydrolysate comprises bioactive peptides generated via enzymatic digestion. These peptides can regulate metabolism, reduce fat accumulation, and improve insulin sensitivity. Goat milk proteins are inherently more digestible and possess distinct casein and lipid structures relative to cow milk, enabling their hydrolysates potentially more beneficial for metabolic health.

Reduction in Lipid Absorption

Certain peptides inhibit enzymes such as pancreatic lipase, hence diminishing fat breakdown and its absorption.

Anti-inflammatory Properties

Obesity is linked to persistent low-grade inflammation. Goat milk hydrolysate peptides possess anti-inflammatory effects that can reduce inflammatory indicators (such as TNF-α and IL-6), hence enhancing metabolic health.

Modulation of gastrointestinal microbiota

Hydrolysates may promote advantageous gut bacteria (e.g., *Bifidobacterium, Lactobacillus*) while diminishing detrimental strains. A more robust gut flora enhances energy equilibrium and lipid metabolism.

Appetite Regulation

Goat milk hydrolysate can activate satiety hormones such as GLP-1 (glucagon-like peptide-1) and PYY (peptide YY). This diminishes hunger and food consumption, so assisting with weight management indirectly.

Enhancement of Insulin Sensitivity

Obesity frequently results in insulin resistance. Specific peptides augment glucose absorption and insulin signaling pathways, facilitating improved blood sugar regulation and less fat accumulation.

Antioxidant Attributes

Goat milk hydrolysates exhibit antioxidant properties, mitigating oxidative stress associated with obesity and metabolic syndrome.

Impact on lipid metabolism

Certain peptides can influence lipid metabolism genes by upregulating fat oxidation genes and downregulating fat storage genes.

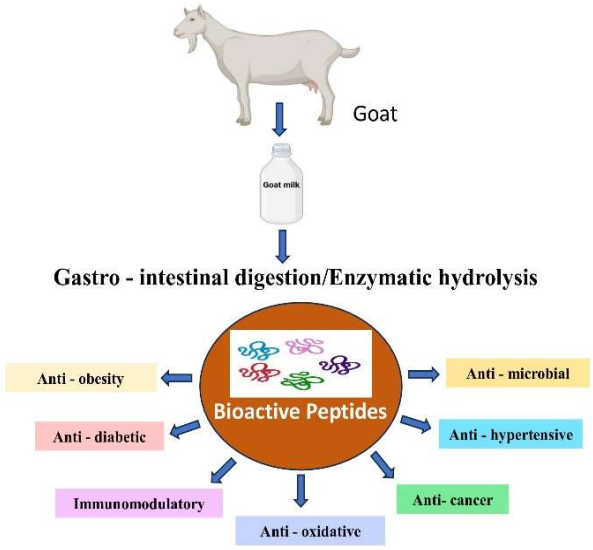

Fig 1: Schematic representation of effect of goat milk hydrolysate.

CONCLUSION

Goat milk hydrolysate presents a promising bioactive property for obesity management. By reducing lipid absorption, modulating gut microbiota and enhancing insulin sensitivity, it can contribute to improved metabolic health. Appetite regulation mechanisms further supports weight management, making goat milk hydrolysate a multifunctional component in diet aimed at combating obesity. Additionally, its anti-inflammatory and antioxidant may mitigate obesity related oxidative stress and chronic inflammation. While further research is needed to optimize its application, the evidence suggests its potential as a valuable tool for promoting metabolic balance and overall wellbeing.

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