REVIEW

Is White Tea a Potential Herbal Drink for Weight Loss? A Narrative Review

Zeinab Rezaee[1], Amir Rashidlamir[1], Karsten Krüger[2], Onur Oral[3]

[1]Faculty of Sport Sciences, Ferdowsi University of Mashhad, Mashhad, Iran, [2]Department of Exercise Physiology and Sports Therapy, University of Giessen, Germany, [3]Ege University, Faculty of Sports Sciences, Izmir, Turkey

ABSTRACT

Obesity is a chronic disease associated with a wide range of ailments and a major cause of mortality in many societies as a serious health condition, many studies have emerged in the last decades to discuss the possible ways to prevent and treat this health threat. Since medicinal plants have always been used throughout history in all regions, recent studies highlighted the efficacy of some herbs to be consumed as a therapeutic tool against overweight and obesity. White tea among other types of tea contains more content antioxidants and polyphenols such as catechins which have been shown effective for weight control and fat oxidation. In addition, a few studies have shown the benefits of white tea consumption besides exercising in reducing Body Mass Index (BMI) and body fat mass. Furthermore, this review aims to sum up the present knowledge about the effects of this historical beverage on weight loss and obesity management as a natural product. There is a necessity for further research to extend the available data to more functional and beneficial achievements.

Keywords: White tea, Weight loss, Obesity, Overweight, Physical activity

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INTRODUCTION

Obesity is a global health issue with an increasing prevalence in the past decades [1, 2] and since its positive relationship with a wide range of morbidities, low quality of life, social problems and impaired mental health has been shown, obesity has become a major concern in many societies [3].

This chronic inflammatory disease is defined by excessive body fat accumulation and measured by some indexes such as MBI (Body Mass Index), WC (Waist Circumference), WHR (Waist/Hip Ratio), and body fat percentage [1-3].

Obesity is known as a multifactorial health condition caused by different reasons such as positive energy imbalance, genetic predisposition, environmental, and behavioral variables, etc.[1-3].

Since obesity co-morbidities and elevated rates of mortality are widely increasing in many countries, weight control and management strategies besides obesity treatment seem an urgent need in modern life [3].

Although several strategies such as following up a healthy diet, regular exercising, and consuming natural products are proposed for obesity management [4, 5], there is still a demand for more research to be done to distinguish the efficacy of herbal ingredients as food supplements for this purpose [2, 6].

TEA, A HISTORICAL BEVERAGE

Tea is a pleasant drink widely used by many populations across the world and prepared from the leaves of Camellia sinensis, an herb that is originally from China [7, 8].

This herb is categorized into six variations: White, green, and yellow. oolong. black and dark tea. The diversity is made by different types of processing steps (Figure 1).

For instance, white tea is made from young leaves of tea herb and undergoes the least manufacturing process.

Moreover, white and green teas are not fermented [7-9].

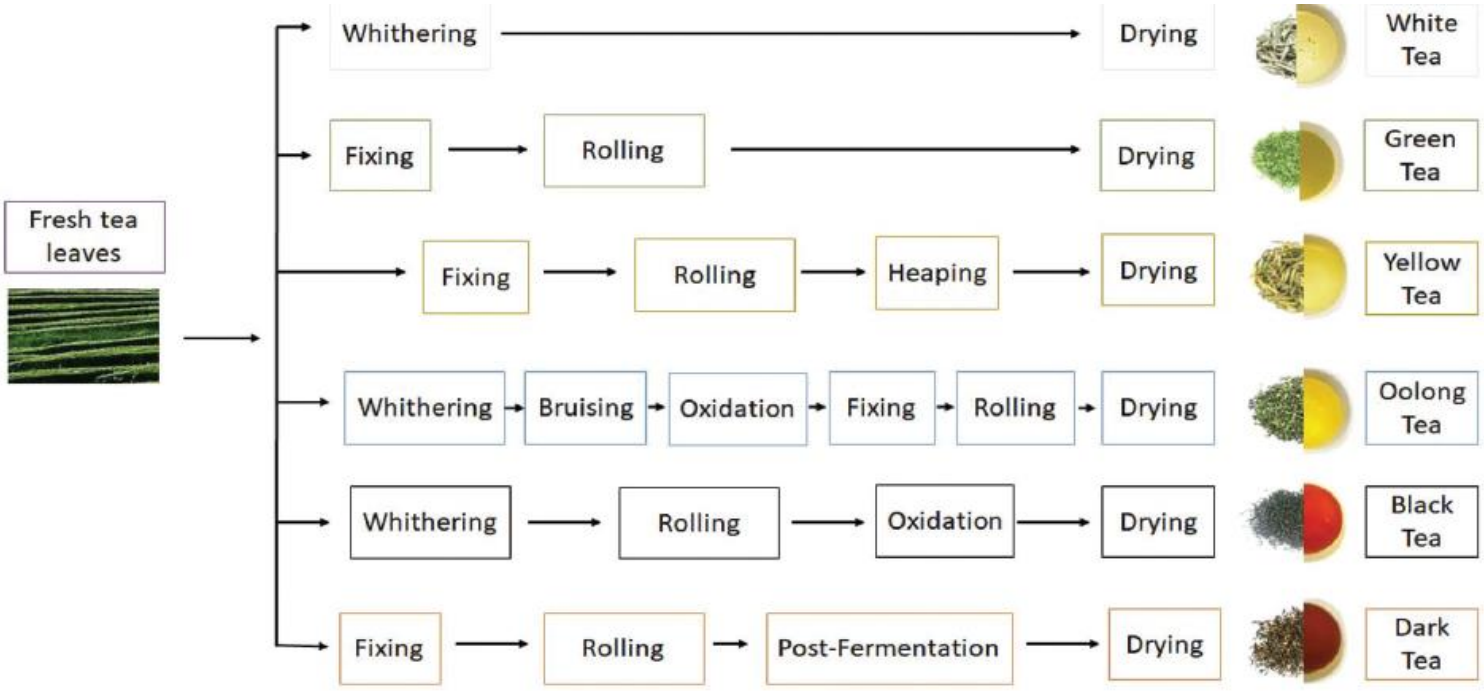

Figure 1. Tea variations and processing steps [7].

TEA COMPOSITIONS

Tea is not only favorable for its beloved taste, but also for its rich capacity for bioactive components that possess a variety of health functions [8]. This worldwide-used drink has been reported to contain about 4000 bioactive components [10]. Many of these components have been identified as health-effective biomolecules in human studies [10-13].

All tea types are composed of amino acids, polysaccharides, some enzymes, vitamin E, C, or B, some minerals like Mg, Ca, Zn, and a diversity of biomolecules such as polyphenols, alkaloids, pigments, and saponins [6-9, 14, 15] but the amount and the diversity of these components are different in different types of tea [13].

BENEFICIAL HEALTH FUNCTIONS OF TEA

Tea is considered a safe drink that can be used in a daily diet [8]. Many studies have shown beneficial effects of tea consumption on health including weight control and obesity treatment [4, 6, 8, 14, 16-22].

It is stated that this historical drink has antioxidation, anti-inflammation, cardio-vascular protection, anti-cancer, and hepatoprotection functions as well as regulation of gut microbiota [23].

The current *in-vitro*, *in-vivo* and human studies show that the tea elements operate via different mechanisms (Table 1).

Based on the available knowledge, despite the effectiveness of tea consumption on health parameters, more studies need to be carried out to elucidate the safe dosage, the probable side effects, the action time, and the related cellular mechanisms in different tea types.

ANTI-OBESITY EFFECTS OF TEA INGREDIENTS

White and green tea with the most quantity of polyphenols such as epicatechin, epicatechin gallate, and epigallocatechin gallate (EGCG) may increase body energy expenditure, fat oxidation, and thermogenesis [6-9, 14, 17, 21] consequently can lead to weight loss or preventing overweight [6].

Although the detailed mechanisms of medicinal plants with anti-obesity effects are not very clear, it is stated that reduction in lipid absorption and lipogenesis, increased lipolysis, and energy expenditure is the outcomes of tea consumption [1, 2, 8, 14, 17, 20, 25].

Accumulation of fatty acids in cells can lead to trigycerids synthesis and consequently increase fat storage and we know the AMPK cellular pathway can activate lipid catabolism by activating β-oxidation and inhibiting *de novo* synthesis of fatty acids, cholesterol, and triglycerids [26]. Recent studies provide evidence that polyphenols of tea can activate the AMPK cellular pathway promoting fatty acid oxidation in liver cells and muscle fibers [9, 20-22].

Table 1. Health functions of tea elements and the mechanisms [23, 24]

The function of tea elements	Mechanism
Antioxidant activity	Cleaning up free radicals Chelating metal ions Activating antioxidant enzymes
Anti-inflammatory activity	Inhibiting production of IL-1β, IL-18, IL-6, IL-12, NO, iNOS, MCP-1 and TNF-α
Cardiovascular protection	Down-regulation of serum LDL Reduction of total cholesterol (TC) Increasing expression of PPARAα Reduction of ROS Anti-hypertension effects
Anti-cancer	Cell proliferation inhibition Cell apoptosis induction Metastasis suppression Angiogenesis inhibition
Hepatoprotection	Inhibition of lipid absorption Reducing oxidative stress and inflammation

Moreover, it is suggested that catechins may inhibit pancreatic lipase and then consequently reduce dietary lipid absorption [6, 21] and it can also inhibit Catecholo-methyltransferase (COMT) an enzyme that degrades norepinephrine (NE) so NE can cause its thermogenic effect in the adipose tissue [14].

According to recent studies, types of teas rich in caffeine and catechins especially white tea can stimulate the sympathetic nervous system (SNS) and activate brown adipose tissue (BAT) via increasing UCPs gene expression which can elevate thermogenesis as an outcome [6].

Additionally, caffeine, a bioactive component in tea leaves can activate the triglyceride (TG) degradation pathway via two intracellular mechanisms. Caffeine can stimulate the β-adrenergic receptor on

adipocytes followed by activating the cAMP signaling pathway to lipolysis. As the second function, caffeine can inhibit cAMP degradation by blocking phosphodiesterase and increase cAMP concentrations as upregulation of PKA and lipolysis at the end [2, 14] however it is worth mentioning that the caffeine levels in coffee are considerably higher than in tea [27] (Figure 2).

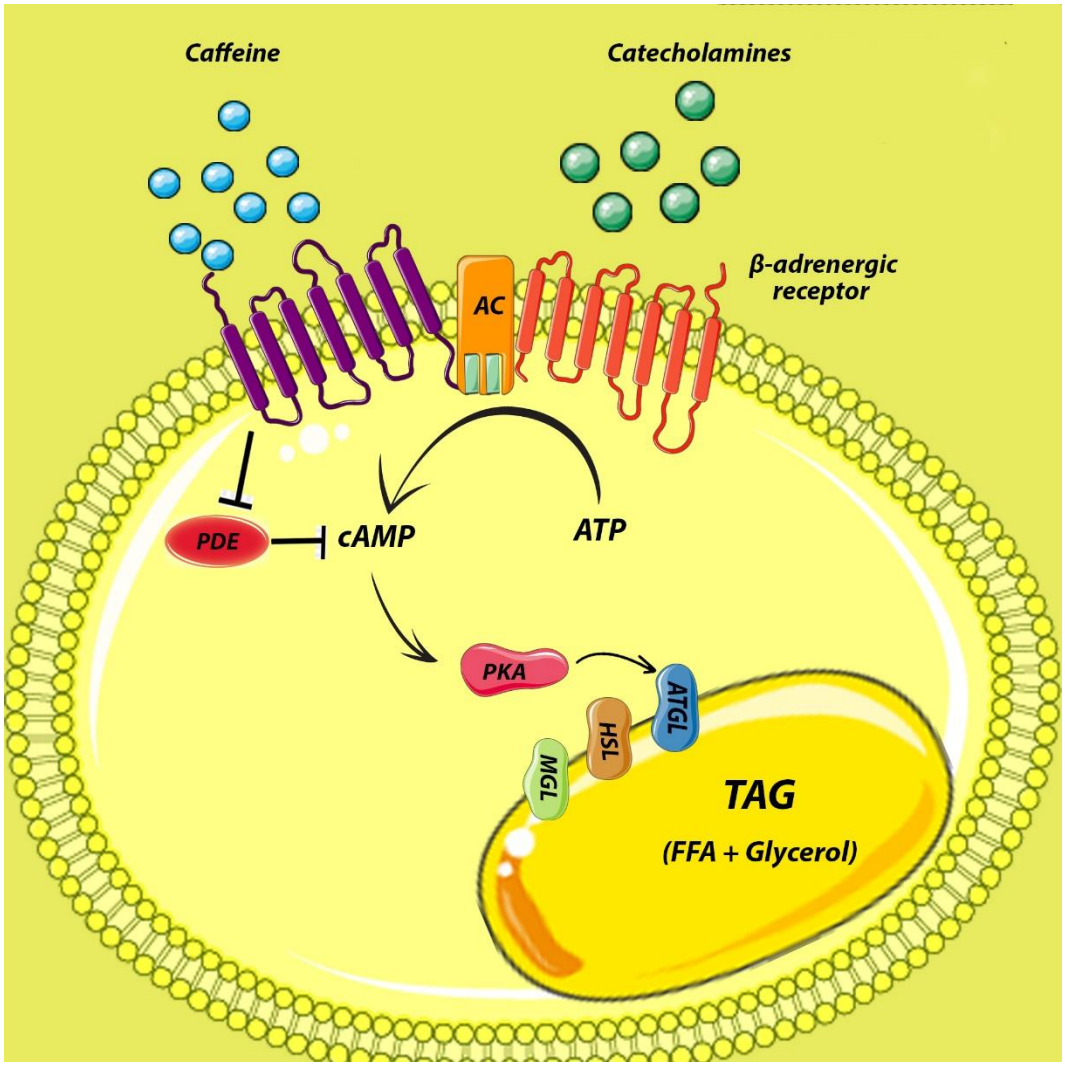

Figure 2. Schematic design of Catecholamines and Caffeine activity in adipocytes.

There is increasing evidence that microbiota has an important role in a variety of health conditions. The gut microbiome regulates several processes of metabolism and thermogenesis and has a notable impact on obesity. It is supposed that tea catechins can positively affect the intestinal microbiota through their anti-obesity functions [6, 21].

WHITE TEA AND HEALTH BENEFITS (Figure 3)

The newly picked young tea buds that undergo no fermentation process and have the least enzymatic oxidation is called white tea which is very rich in polyphenolic components. White tea harvesting occurs once a year in the spring [28, 29].

Although white tea possesses the least amount of caffeine among other types of tea, it is enriched by catechin content (Figure 4) that may have potential benefits for some health issues such as cardiovascular diseases, cancer, male infertility, diabetes, and neurodegenerative diseases, however, the mechanisms of functions are not very clear yet [16, 28, 30-33].

Recent studies have demonstrated that the potentialities of white tea for positive effects on inflammatory diseases are likely due to the rich amount of the anti-oxidants in this herb [16, 25, 28, 34].

In the same direction, animal model studies have also reported the association between white tea consumption and some health benefits such as significant weight loss in ovariectomized rats that encountered obesity due to estrogen deficiency [35], decreasing lactate, and restoring Lactate Dehydrogenase (LDH) activity in cardiac cells of prediabetic rats [36], improving sperm quality and mobility [33], and antioxidant content of cerebral cortex in prediabetic rats as well [19].

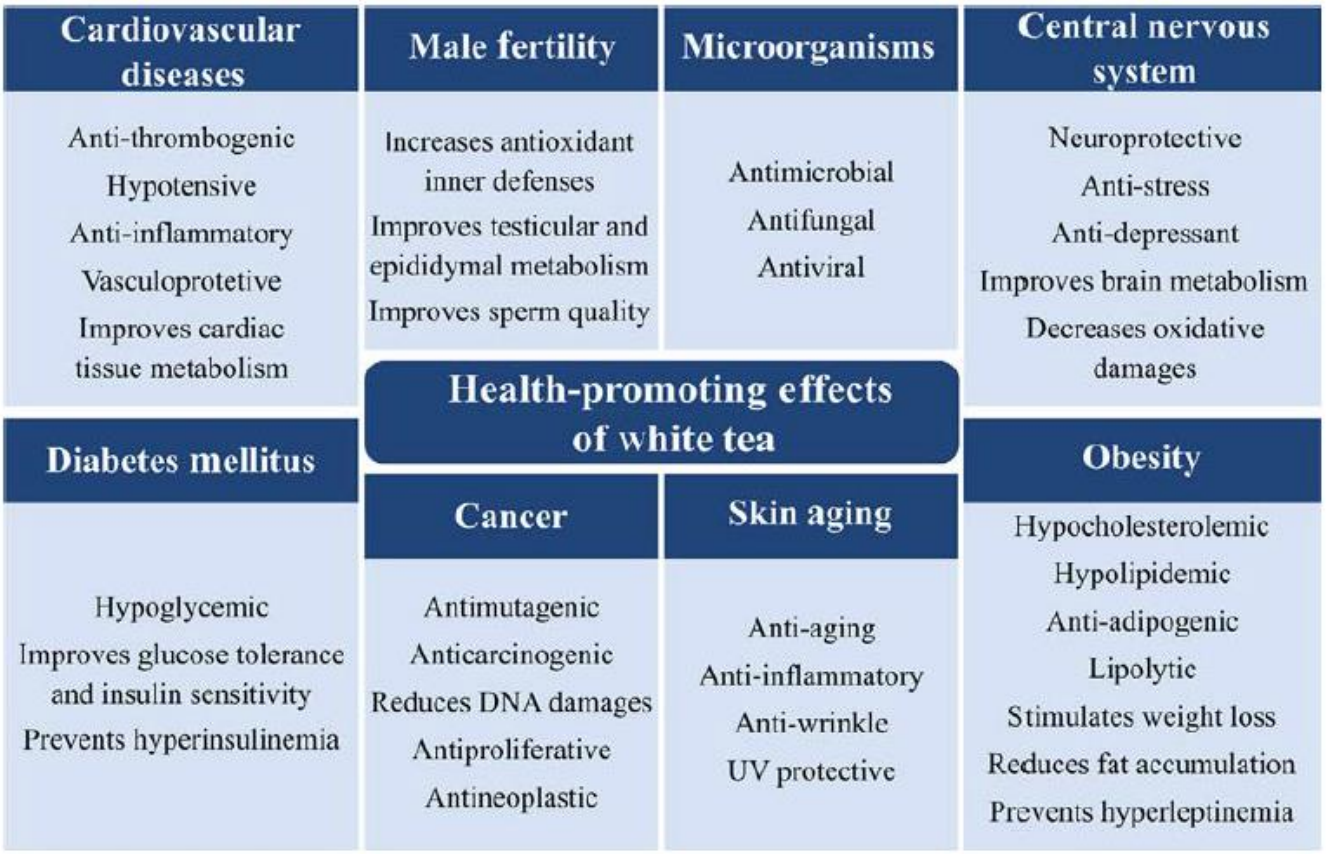

Figure 3. The potential positive effects of white tea on human health [28]

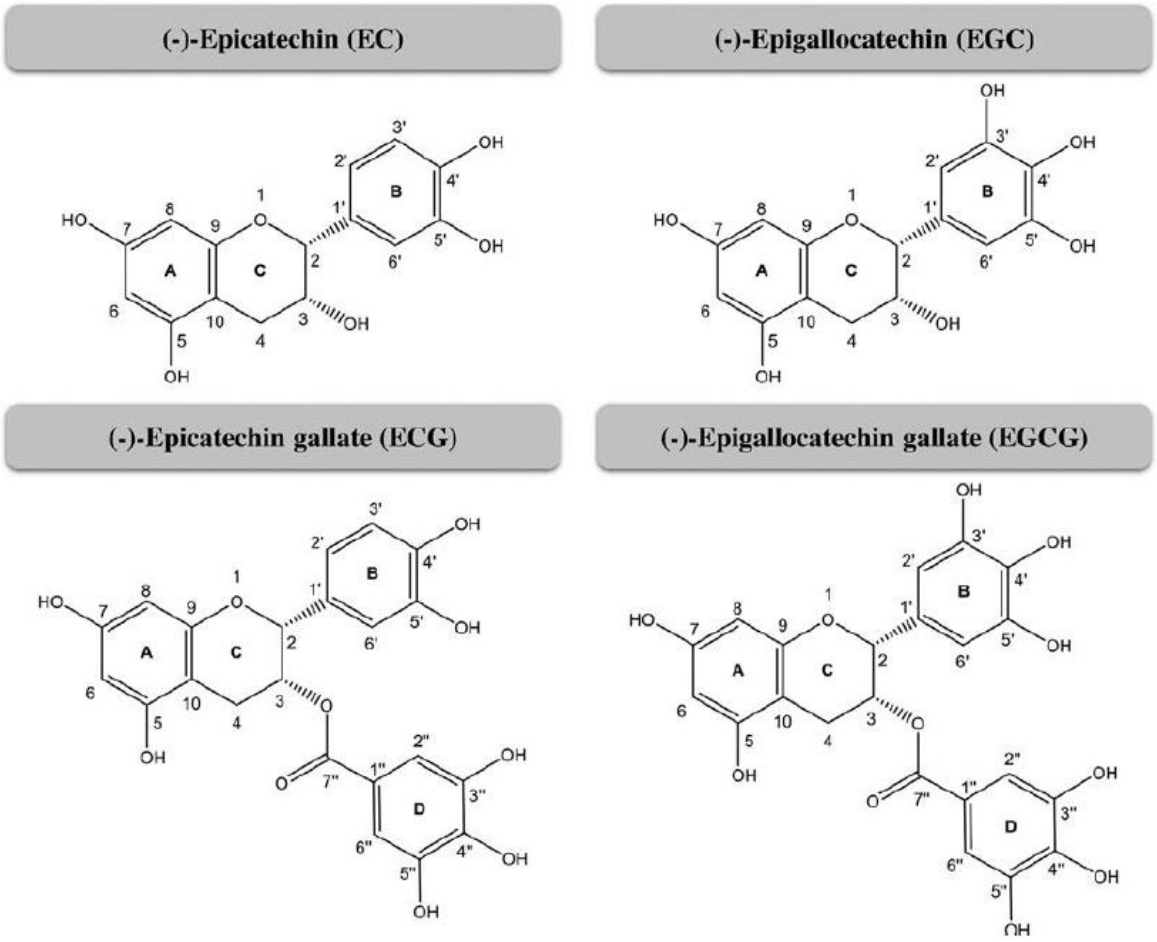

Figure 4. Chemical structure of catechins available in white tea [28]

WHITE TEA SUPPLEMENTATION AND EXERCISE

According to a huge number of studies performed so far, physical activity is one of the most impressive interventions for weight loss and obesity treatment [5] and that is why many researchers all over the world have been trying to analyze the effect of different training protocols with or without supplementations as a safe and accessible way to cure obesity and overweighing [37, 38].

However, there are a few studies investigating the effect of white tea supplementation alongside exercising, current knowledge shows that white tea consumption with aerobic training can significantly reduce BMI, LDL, cholesterol, and TG while increasing HDL [39].

Similarly, it is reported that white tea consumption one hour before a single session of exercising can elevate fat oxidation in obese individuals [40].

More research is needed to observe the possible benefits of white tea consumption with regular exercise on weight loss, weight control, and obesity treatment [41].

CONCLUSION

Obesity is a rapidly increasing pandemic associated with morbidity and mortality that has become a major health concern in many countries. Therefore introducing efficient and effective strategies for obesity management can be a perspective for future research and studies.

Since medicinal plants have always been used for the treatment of diseases throughout history and the efficacy of a wide range of them has been shown in many studies, it is still an interesting and necessary field of research.

Tea as a commonly used drink all over the world has some reported beneficial effects on health that are assumed due to the rich bioactive components in its leaves such as polyphenols, caffeine, tanins, polysaccharides, vitamins, minerals, alkaloids, pigments, and saponins.

Among diverse categories of tea herbs, white tea is the least fermented or even no fermented and oxidated type that is harvested once a year in the early weeks of spring and then undergoes the least manufacturing process as well.

Furthermore, white tea leaves contain a vast amount of polyphenols such as catechins and it is assumed that most of the white tea's potential for health benefits is related to its catechin content.

According to our present knowledge, white tea is a potent plant to be used in the food supplement industry as an efficient pharmaceutical product for weight loss and obesity treatment. However, further studies are needed to investigate the relationship between white tea consumption dosage and positive health effects, possible side effects, and interactions with other lifestyle interventions such as physical activity.

This review summarized the notable present studies demonstrating the effects of drinking white tea as a safe beverage in the daily diet on health and its potential to be used against obesity. Nevertheless, a few studies are emerging on the effects of consuming this kind of tea besides regular exercise to observe more accurate results of this combination on the weight loss process.

Thus, future research can shed light on more functional methods of using white tea as a therapeutic way to manage obesity and may suggest a cost-effective and safe supplement besides training routines for obese and overweight individuals.

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Conflict of interest

The authors declare no conflict of interest.

Footnote

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Corresponding author: **Amir Rashidlamir,** E-mail: rashidlamir@um.ac.ir