



2024 (Autumn), 2 (3): 18-24

DOI: <https://doi.org/10.71702/eps.2024.1199939>

Research article

Journal of Physiology of Training and Sports Injuries

([PTSIJournal@gmail.com](mailto:PTSIJournal@gmail.com))

([zanjan.ptsijournal@iau.ir](mailto:zanjan.ptsijournal@iau.ir))

<https://sanad.iau.ir/journal/eps>

Received: 2024/7/4

Accepted: 2024/9/15

(ISSN: 3060 - 6306)

## Effects of eight weeks interval training and casein supplementation on the fatty acid transporter FATCD 36 in obese women

Somayeh Khosravanian<sup>1</sup>, Abdolmajid Emami<sup>2</sup>, Samaneh Zare<sup>3,4</sup>

1. M.Sc. Sports Nutrition, Department of Sports Sciences, Yazd Branch, Islamic Azad University, Yazd, Iran.

2. Assistant Professor, Department of Sport Sciences, Meybod Branch, Islamic Azad University, Meybod, Iran.

(Corresponding author). Email: [emami1359@yahoo.com](mailto:emami1359@yahoo.com)

3. Department of Sports Sciences, Payam Noor University, Yazd, Iran.

4. Ph.D. Student, Department of Sports Sciences, Damghan Branch, Islamic Azad University, Damghan, Semnan, Iran.

### Extended Abstract

#### Introduction

Many regulatory processes occur in fatty acid oxidation in skeletal muscle. For example, we can mention the transfer of this substrate into the muscle cell, because a large amount of the oxidized fatty acid is provided by plasma non-esterified fatty acids. These transport proteins have different effects on fatty acid transport from the sarcolemma, but among these transporters, FATCD 36 has the most positive effect. Intense intermittent exercise can increase the relative expression of fatty acid transporters in adipocytes, strengthening the hypothesis of facilitating the uptake of free fatty acids by adipose tissue. Interval training is one of the exercises that increases the ability of muscles to oxidize fat and can reduce subcutaneous and abdominal fat. In interval training, breathing during recovery periods improves oxygen replenishment and ultimately increases fat metabolism compared to continuous training. Sex-related hormonal differences have a significant effect on substrate oxidation, such that the response of hormones affecting lipolysis, transport, and oxidation of fatty acids during exercise is different in women than in men.

Casein protein increases the rate of protein synthesis as a mechanism for increased amino acid incorporation. Researchers studied the effects of casein micelles on the transport of lipophilic organic compounds. Casein micelles, due to their natural role as hydrophobic substance delivery systems, have a lipophilic core stabilized by an electrical double layer structure, allowing access to the core and therefore the incorporation of fat-soluble bioactive substances. In this way, lipophilic substances can be incorporated into casein micelles and transported. Research on the use of casein protein supplementation has introduced a new research paradigm related to the timing of protein intake. The aim of this systematic review was to understand the effects of casein protein on energy expenditure, lipolysis, appetite, and food intake in healthy and obese individuals. With regard to the use of proteins as energy-yielding adjuncts in sports nutrition, a comparison based on the delayed muscle fatigue index showed that casein protein has greater advantages than whey protein.

Interval training improves skeletal muscle oxidative capacity, increases peak oxygen consumption, increases insulin sensitivity, increases mitochondrial enzyme activity and skeletal muscle and body fat oxidation, reduces weight, and reduces hyperglycemia. With this description, the present study aims to study the effect of eight weeks of interval training and casein supplementation on the fatty acid transporter FATCD 36 in obese women. Interval training may have equal or greater metabolic benefits than other forms of exercise by increasing energy expenditure during and after activity and by shifting the substrate toward fat utilization. The limited research on the use of casein protein supplementation has introduced a new research paradigm related to the timing of protein intake.





## Method

The aim of the study was to determine and compare the effects of eight weeks of interval training and casein supplementation on the fatty acid transporter FATCD 36 in obese women. The statistical sample of this semi-experimental study included 40 obese female (age:  $28 \pm 3.5$  years and BMI:  $32.71 \pm 2.5$  kg/m<sup>2</sup>) volunteers who were divided by simple randomization into four equal groups: exercise, exercise and casein supplementation, casein supplementation, and control. The training groups performed a running interval training program for eight weeks, three sessions per week. The subjects ran a distance of 20 meters in 30 seconds at maximum speed back and forth, followed by 30 seconds of walking. The training in the first week consisted of four repetitions of activity and four rest periods, with one activity and one rest period added each week in the following weeks. Each subject consumed 20 grams of Pegah Company Casein supplement powder dissolved in 200 cc of water with their lunch daily. The levels of the fatty acid transporter FATCD 36 were measured using a kit from Zelbio, Germany.

## Results

The results of two-way ANOVA and Tukey's post hoc test showed that there was a significant difference between the mean levels of fatty acid transporter FATCD 36 in all groups compared to the control group ( $P \leq 0.05$ ). Therefore, both eight weeks of interval training, eight weeks of casein supplementation, and the combination of exercise and supplementation have an effect on the fatty acid transporter FATCD 36 in obese women.

## Discussion and Conclusion

The integrated process of fatty acid release, transport, absorption, and ultimately oxidation during physical activity is enhanced by the joint action of neural, metabolic, and hormonal stimuli, especially stress hormones. Many regulatory processes occur in fatty acid oxidation in skeletal muscle. For example, we can mention the transfer of this substrate into the muscle cell, because a large amount of the oxidized fatty acid is provided by plasma non-esterified fatty acids. In muscle cells, contraction and insulin secretion induce the translocation of fatty acid transporters to the sarcomere membrane surface. Interval training, while increasing or preserving muscle mass, induces adaptations similar to endurance and resistance training through signaling pathways. These exercises promote weight loss by increasing energy expenditure during and after activity and by shifting the substrate toward fat utilization. Interval training may have metabolic benefits equal to or greater than other forms of exercise. High-intensity interval training can increase the relative expression of fatty acid transporters in adipocytes, supporting the hypothesis that they facilitate the uptake of free fatty acids by adipose tissue. Research on the use of casein protein supplementation has introduced a new paradigm of research related to the timing of protein intake. The aim of these studies was to understand the effects of casein protein with different dietary sources on energy expenditure, lipolysis, appetite, and food intake; however, data are limited and future research is needed. **However, both eight weeks of interval training, eight weeks of casein supplementation, and the combination of exercise and supplementation have an effect on the fatty acid transporter FATCD 36 in obese women.**

**Keywords:** Interval Training, Casein, Fatty Acid Transporter, Obesity.

**How to Cite:** Khosravanian, S., Emami, A., Zare, S. (2024). Effects of eight weeks of interval training and casein supplementation on the fatty acid transporter FATCD 36 in obese women. *Journal of Physiology of Training and Sports Injuries*, 2(3):18-24. [Persian].

فصلنامه فیزیولوژی تمرین و آسیب های ورزشی؛ پاییز ۱۴۰۳، ۲(۳).

