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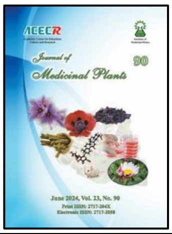

Research Article

The effect of high-intensity functional training with thylakoid supplementation on interleukins-1beta and interleukins 8 in obese men

Heidar EbadiAsl[1], Bahman Mirzaei[2,*], Arsalan Damirchi[2]

[1] *Department of Exercise Physiology, University of Guilan, Guilan, Iran*

[2] *Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Guilan, Iran*

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ABSTRACT

Background: Obesity is a widespread public health concern with a growing global prevalence, leading to an increased risk of chronic metabolic conditions. Despite this, research on the impact of exercise and supplementation on inflammatory factors in obese individuals is limited. **Objective**: This study evaluates the effects of high-intensity functional training (HIFT) and Thylakoid supplementation on interleukins-1beta and interleukin-8 levels in obese individuals. **Methods:** In this study, 44 obese men were allocated into four groups: control (C), Thylakoid supplement (T), HIFT (H), and a combination of supplements and exercise (HT). Participants followed the HIFT exercise protocol for 12 weeks, while those in the supplement groups received Thylakoid supplement for the same duration. Body mass index, inflammatory biomarkers were assessed through blood samples before and after the 12-week intervention. **Results**: In these groups, H, T, and HT, the levels of inflammatory factors interleukin-1beta and interleukin-8 were compared. In the case of interleukin-8 a significant difference was observed in the H and HT groups compared to the T group. Also, significant decrease in interleukin-1beta level was observed in all groups, H, T, and HT, compared to the control group ($P < 0.001$). Interestingly, the mentioned factors in both H and HT groups also showed a significant difference ($P < 0.001$). **Conclusion**: The findings of the study showed that the HIFT protocol and the use of thylakoid supplements can reduce systemic inflammatory indicators in obese men by showing a synergy effect. Therefore, HIFT exercise with thylakoid supplements can be considered an effective way to reduce inflammation in obese people.

1. Introduction

In the 20th century, obesity became recognized as a significant health issue, escalating to epidemic levels worldwide. Data from the World Health Organization (WHO) indicates that it is responsible for at least 2.8 million deaths annually. Previously linked primarily to high-income nations, obesity is now

Abbreviations: HIFT, High-intensity functional training; C, Control; T, thylakoid supplement; H, High-intensity functional training group; HT, thylakoid supplement and exercise group; WHO, World Health Organization; MASLD, metabolic dysfunction-associated steatotic liver disease; BMI, body mass index; CRP, C-reactive protein; TNF-α, tumor necrosis factor α; IL-6, interleukin 6; WAT, white adipose tissue

*Corresponding author: mirzaei@united-world-wrestling.org

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also widespread in low- and middle-income countries, affecting individuals of all ages [1]. Obesity contributes to various chronic conditions, such as type II diabetes, metabolic syndrome, atherosclerotic cardiovascular disease, metabolic dysfunction-associated steatotic liver disease (MASLD), cirrhosis related to MASLD, chronic kidney disease, cancers, as well as mental health issues and accelerated aging. Many global efforts have been launched to counteract the ongoing rise in average body weight, but these initiatives have not achieved significant success [2].

Obesity, characterized by chronic low-grade systemic inflammation or "metabolic inflammation," plays a role in the development of various diseases, including atherosclerosis and coronary artery disease. Adipose tissue functions as a metabolically active endocrine organ that regulates energy expenditure and appetite, as well as reproductive and endocrine processes, inflammation, immunity, and serves as a storage site for triacylglycerol. Visceral fat is closely linked to an increased risk of diabetes and cardiovascular diseases, more so than a high body mass index (BMI). While the exact reason for this association is not fully understood, it is suggested that visceral fat may contribute to systemic inflammation by directly releasing free fatty acids and inflammatory cytokines into the portal circulation [3].

One of the widely accepted theories posits that chronic systemic inflammation caused by obesity is a major contributing factor. This theory is well-supported by numerous studies and clinical evidence; for example, inflammatory markers like CRP, TNF-α, and interleukin 6 (IL-6) are found to be elevated in individuals who are obese and insulin-resistant. Additionally, research from the mid-1990s indicated that the white adipose tissue (WAT) of obese rodents and humans showed alterations in the levels of pro-inflammatory substances, such as TNF-α [4]. Chronic low-grade inflammation in adipose tissue, often referred to as meta-inflammation, is closely linked to excess body fat and is marked by the infiltration and activation of pro-inflammatory macrophages and other immune cells that generate and release pro-inflammatory cytokines and chemokines [4]. A classic inflammation VS meta-inflammation is shown in Figure 1.

IL-1β is a strong pro-inflammatory cytokine primarily generated by macrophages, monocytes, and dendritic cells, and it plays a crucial role in regulating inflammatory and immune responses [6]. IL-1β is a cytokine that induces fever and is primarily generated by blood monocytes in reaction to infections, injuries, or immune challenges. It leads to fever, low blood pressure, and the release of other pro-inflammatory cytokines like IL-6. The active form of IL-1β is produced from its inactive precursor, pro-IL-1β, through the inflammasome. Consequently, IL-1β has become a key player in triggering the pro-inflammatory response associated with obesity [7].

In contrast, exercise encourages various anti-inflammatory signals that help mitigate low-grade systemic inflammation. It does this by lowering the expression of Toll-like receptors (TLR2 and TLR4) in immune cells, reducing the activity of M1 macrophages and CD8+ T-cells, decreasing the infiltration of macrophages in adipose tissue, and enhancing the blood and nutrient supply to adipocytes in visceral fat [8].

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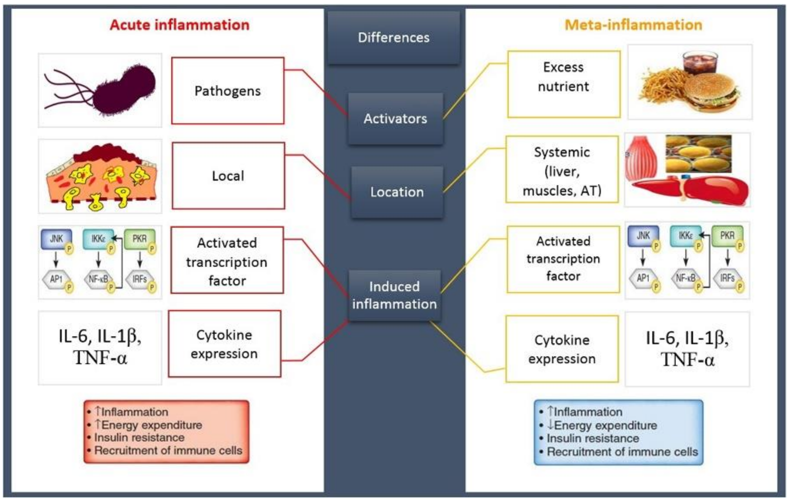

Fig. 1. Illustrates the difference between classic inflammation and meta-inflammation. Both processes trigger an inflammatory response through the upregulation of similar inflammatory genes and cytokines. Classic inflammation is typically caused by invasive external pathogens, which activate the immune system and result in a short-term, intense local inflammatory response. In contrast, meta-inflammation arises from excess nutrients and endogenous stimulants, leading to immune system activation and resulting in chronic low-grade systemic inflammation (LGSI) [5]. Abbreviations: AT, adipose tissue; IL, interleukin; TNFα, tumor necrosis factor α; JNK, c-Jun N-terminal kinase; IKK, inhibitor of kappa light polypeptide gene enhancer in B-cells kinase; PKR, protein kinase R; NF-κB, nuclear factor kappa-light-chain-enhancer of activated B cells; IRF, interferon regulatory factor[5].

For a long time, the place of exercise has been identified as an efficient method of preventing obesity and its consequences. But what is interesting is the dual effect (positive and negative) of exercise on the phenomenon of inflammation, so in some studies, exercise has increased inflammatory factors, and in some, it has led to the suppression of these reactions. High-Intensity Functional Training (HIFT), which has gained the attention of sports communities in recent years, emphasizes movements that involve several joints simultaneously, and compared to old sports patterns, it activates more muscles so that it is very efficient in reducing the content of fat tissue and weight [9]. Therefore, more research should be done on the effects of exercise on the factors involved in fat tissue inflammation.

During the last decade, due to the recognition of the side effects of drugs and the emergence of drug resistance in people, herbal medicines have been considered a healthier source without side effects. Currently, due to the harmful role of inflammation in obesity, the use of herbal supplements with anti-inflammatory effects to reduce the level of systemic and local inflammation (fat tissue) has been investigated by researchers. thylakoids are compounds found in the chloroplasts of dark green plants such as spinach and include different types of proteins, galactolipids, phospholipids, and antioxidants such as chlorophyll, carotenoid, and lutein [10]. Studies have shown that thylakoid can reduce appetite and help lose weight [11]. It has also been reported that consumption of thylakoids derived from spinach leaves has reduced adipokines leptin, resistin, vaspin, and visfatin and reduced insulin resistance in obese men [12]. Therefore, more detailed studies on these herbal compounds and the importance of exercise in reducing the risk of obesity and metabolic diseases can provide a more accurate approach to weight loss and suppressing inflammation in obese people.

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However, so far, no report has investigated the combined effect of high-intensity functional exercise and thylakoid supplementation on inflammatory parameters in the serum of obese people. Therefore, this issue was investigated in the present study.

2. Materials and methods

The current research is a semi-experimental type with a pre-test-post-test design, which was conducted in two stages before and after the intervention and controlled with a placebo in the field and laboratory. The statistical sample (according to the sample size determination formula) [16] included 44 obese men (BMI ≥ 30) in the age range of 23 to 32 years. The samples were selected through a call in administrative and public centers. All experimental procedures were voluntary, with full consent, and approved by the ethics committee. All ethical principles were observed during the training process, and the subjects could withdraw from the research at any time during the training period. Participants in this study must not have chronic illnesses as identified in the medical history questionnaire (including cardiovascular diseases, diabetes, or any injuries that restrict their ability to engage in physical activity), must not use any dietary supplements, and should not smoke or consume alcohol or drugs. They should also have avoided low-calorie diets for the past six months and should not have participated in regular daily sports activities over the last two years. Additionally, participants should not have taken nutritional supplements, and their waist circumference to height ratio must exceed 0.5. Criteria for withdrawal from the study include missing more than one exercise session, experiencing an accident or physical injury, or any factors that hindered effective participation in training. According to the established schedule, participants visited the laboratory to complete personal information, health, and physical activity questionnaires, as well as to assess anthropometric measurements. Additionally, fasting blood samples of 7 cc were collected from participants 48 hours before the training protocol and thylakoid supplement intake, and again 48 hours after the last training session and supplement intake to measure inflammatory markers. The participants were divided into the following groups based on individual characteristics (n = 11):

1. Control group (C): People in this group had 12 weeks of daily life without participating in regular sports activities.

2. Supplemental group (T): Participants in this group consumed 5 grams of thylakoids dissolved in a glass of water 30 minutes before lunch without participating in exercise.

3. HIFT group (H): People did HIFT exercise for 12 weeks in this group.

4. HIFT + supplement group (HT): The participants of this group received thylakoid supplements in addition to exercise. Packages containing thylakoid supplements were distributed among the participants in this group. In addition to exercise, the participants dissolved the contents of the bags containing the thylakoid supplement in a glass of water and consumed it 30 minutes before lunch.

2.1. Anthropometric assessment

Participants visited the laboratory as per the predetermined schedule to assess their anthropometric measurements. Their weight was recorded 48 hours before the program commenced and again 48 hours after it concluded, without shoes, using a digital scale that measures to the nearest 100 grams. Height was measured using a tape measure while participants stood barefoot against a wall,

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ensuring their shoulders were in a relaxed position, with an accuracy of 0.1 cm. BMI was calculated by dividing the weight in kilograms by the square of height in meters.

2.2. HIFT exercise protocol

For 12 weeks, subjects were subjected to HIFT exercise according to the method presented by Feito and his colleagues [13]. Crossfit was used as a HIFT program. The first two sessions of the training program were done to get familiar with common movements (squat, deadlift, press, jerk, barbell, movement with dumbbells, clean movement with medicine ball, pull-up barfix movement, kettlebell swing movement). At the beginning of the third day, each training session includes 10-15 minutes of stretching and warm-up, 10-20 minutes of training and training techniques, and 20-60 minutes of daily exercise (WOD), which was performed at a very high intensity and according to the individual's ability. The main training components of aerobic activities (Running, jumping rope), body weight activities (Traction Barfix, Scott), and weight lifting (Front squats, kettlebell twists), which are always performed in the form of Crossfit exercises in single double and triple sets for time, repetitions or weight were included. Selected movements from Table No. 1 were used. The training process in both experimental groups included three stages: warming up, main training, and cooling down. The functional exercises selected by the HIFT group and HIFT supplement were performed in each training session circularly and according to the principle of overload. This protocol was performed in the first week in 20 minutes with an intensity of 40 to 50 % of the maximum heart rate, in the second week, 40 minutes with a power of 50 to 60 % of the maximum heart rate, and in the third week, 50 minutes with a power of 50 to 60 % of the maximum heart rate, and in the fourth week, 50 minutes with a power of 60 to 70 % of the maximum heart rate and finally in the last eight weeks, 60 minutes with an intensity of 60 to 70 % of the maximum heart rate.

The schedule of training sessions was one (one movement like M), two (two alternating movements as activity-rest including G, M), and three (three 20-minute activities with the combination of M, G, W) were performed. In this program, M is an activity with a long distance and slow speed, G is a heavy skill, and W is a movement with heavy weight and low repetitions. The training program included three days of training and one day of rest; the first day of WOD training included one type of activity, the second day of WOD training included two types of activities, and the third day of WOD training included three types of activities and the fourth day included rest. Each day, the duration of completing each workout, the total rounds and repetitions completed for each movement, the weights used, and any required changes to each workout program were recorded for each participant. Exercise intensity was calculated using the Karvonen formula [14].

The target heart rate was determined according to the following formula:

Target Heart rate = Resting Heart Rate + A * Reserve

Reserve = Maximum Heart Rate-Resting Heart Rate

2.3. Thylakoid supplement preparation

In the present study, a thylakoid supplement was prepared according to the method described by Emek and his colleagues [15]. Thus, after separating the stems and veins of spinach, about 1000 grams of leaves washed with 1250 ml of water were homogenized in a mixer and filtered through a four-layer monodor polyester mesh (20

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micrometers). The obtained filter was diluted 10 times with distilled water, and its pH reached 4.7 with the help of hydrochloric acid. The obtained product was kept at -4°C for 4 hours until a green precipitate was obtained. The supernatant was discarded, and the precipitate containing Thylakoids was collected. Repeated washing was done with satrifuges, and finally, the final sediment was collected. After adjusting the pH = 7, the final sediments were dried to obtain a green Thylakoid powder.

2.4. Measurement of biomarkers in blood

Fasting blood samples were collected in two stages: pre-test (48 hours before the start of the study) and post-test (48 hours after the completion of the research protocol). 7 ml of blood was collected from the brachial vein and transferred to tubes containing EDTA anticoagulant. After centrifugation (10 minutes, 3000 rpm), the plasma samples were separated and transferred to the freezer to measure the target biomarkers. In this study, the levels of interleukin-8(Cat. No. K21-900, Citeab, UK) and interleukin-1beta (Cat. No. BLB50, R&D System, USA).

2.5. Statistical analysis

In the present study, the normal distribution of the data was shown by the Golmogorov-Smirnov test. To compare pre-test and post-test changes in each group, a Paired t-test was used. A comparison of changes among different groups was done by analyzing covariance (Ancova) and Bonferroni's post hoc test. Data are shown as mean ± standard deviation. All analyzes were done using SPSS version 22 software. $P < 0.05$ was considered as a significant level.

3. Results

In this study, the desired variables, including body weight, body mass index, and levels of interleukin-1 beta and interleukin-8 were compared in two stages of pre-test and post-test. The results of this comparison are shown in Table 1. Table 2 shows the mean and standard deviation of Body weight, body mass index, and levels of interleukin-1 beta and interleukin-8 in the groups at the two stages of the pre-test and post-test.

Table 1. Movements used in the HIFT protocol

Movements using body weight	aerobic activity	Movements with weights
Bodyweight Squat	Run	Deadlift
Pull-up (Barfix)	Riding bike	Clean
Push-ups	Rowing	Chest Press
Dip	Skipping rope	Snatch
Swimming		Clean and Jerk
Rope climbing		Movements using medicine ball
Burpee		Kettlebell Swings
Loin Fillets		Dumbbell Movements
Sit-ups		Barbell
The types of jumps		Goblet Squat
Lunge		

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Table 2. Body weight, body mass index and levels of interleukin-1 beta and interleukin-8 in two stages of pre-test and post-test

Variable	Group	Before training	After training	Intergroup p
IL-1B	C	4.557 ± 0.28	4.670 ± 0.09	< 0.001
	T	4.534 ± 0.28	4.003 ± 0.28	
	H	4.628 ± 0.30	3.576 ± 0.17	
	HT	3.391 ± 0.28	2.468 ± 0.18	
IL-8	C	4.378 ± 1.136	4.362 ± 0.608	< 0.001
	T	4.744 ± 0.879	4.023 ± 0.814	
	H	4.701 ± 1.026	3.006 ± 0.478	
	HT	4.714 ± 0.742	3.156 ± 0.533	
BMI (kg/m^2)	C	33.08 ± 1.34	32.87 ± 1.44	< 0.001
	T	32.66 ± 1.37	31.93 ± 0.93	
	H	33.22 ± 1.07	31.85 ± 1.19	
	HT	33.05 ± 0.75	30.68 ± 0.98	
body weight (kg)	C	94.33 ± 1.82	93.55 ± 2.43	< 0.001
	T	93.28 ± 2.61	91.13 ± 2.12	
	H	92.78 ± 1.89	89.19 ± 2.37	
	HT	94.13 ± 1.90	87.25 ± 2.30	

Body weight, body mass index and levels of interleukin-1 beta and interleukin-8 in two stages of pre-test and post-test in the control group (C) without performing the exercise protocol and not receiving supplements, the high-intensity HIFT functional training group (H group), the thylakoid supplement receiving group (T) and the group who received the supplement in addition to exercise. Data are shown as mean ± standard deviation.

Interleukin-8 is one of the important pro-inflammatory cytokines whose role has been proven in the pathophysiology of obesity, so in the present study, the serum level of this factor was measured. Statistical analysis by the ANOVA test showed that, in general, there is a significant difference between the test groups ($P < 0.001$). Therefore, the groups were compared by Benferoni's post hoc test. The results of the subsequent Bonferroni test showed a significant difference between the H and HT groups and the control group (respectively, at the $P < 0.001$ and $P < 0.01$). Also, a significant difference was observed between H and HT groups compared to the T group at $P < 0.01$ and $P = 0.012$. However, no significant difference was observed between the group that only underwent sports training (H group) and the group that received additional training (HT) ($P = 1$). The results of this comparison are shown in Figure 2.

Another pro-inflammatory cytokine evaluated in the present study was interleukin-1beta. Statistical analysis by the ANOVA test showed a significant difference between the experimental groups ($P < 0.001$), so we compared the groups by Bonferroni's post hoc test. The graph shows a significant decrease in interleukin-1beta level was observed in all three groups, H, T, and HT, compared to the control group ($P < 0.001$). Also, the difference between the H and HT groups compared to the T group was significant ($P < 0.001$). The interesting thing to note is that the comparison of the supplement group with exercise (HT group) with the exercise alone group (H group) also shows a significant difference ($P < 0.001$). The results of this comparison are shown in Figure 2.

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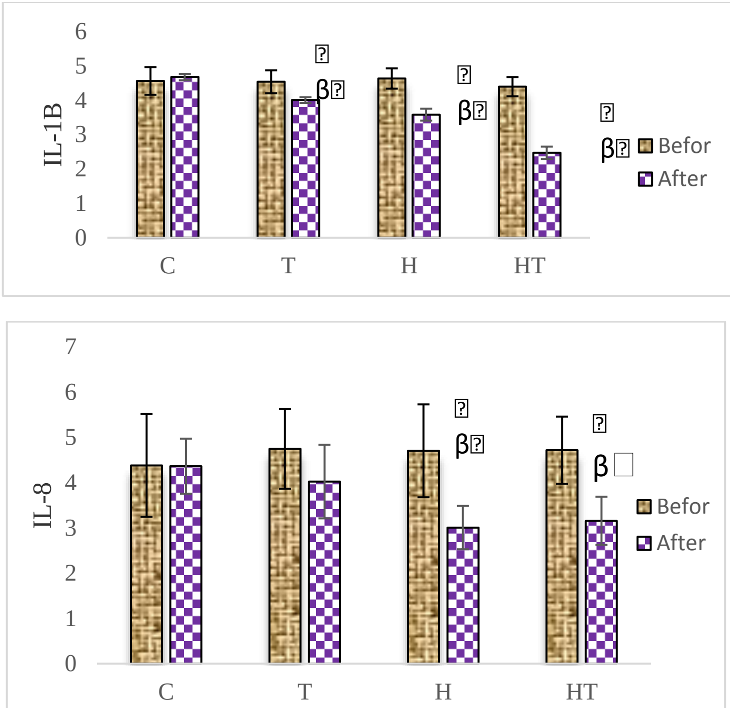

Fig. 2. Changes in the serum levels of interleukin 1 beta and interleukin 8 in the control group (C) without performing the exercise protocol and not receiving the supplement, the high-intensity functional HIFT training group (H group), the Thylakoid supplement group (T) and the group that received the supplement in addition to exercise .*compared to the control group and β compared to the H and T groups. Data are shown as mean ± standard deviation.

4. Discussion

In the current study, the effect of high-intensity functional exercise training (HIFT) alone and with thylakoid supplementation on body mass index and inflammation-related parameters in obese people was investigated. In this study, we tried to evaluate a diverse profile of inflammatory factors. Therefore, the level of interleukin-1beta and interleukin-8 were measured as factors that increase inflammation.

The findings of the present study showed that the HIFT exercise program with thylakoid supplement can significantly reduce inflammatory markers, including interleukin-1 beta and interleukin-8 compared to the control group that did not receive any of the exercise interventions or supplements. In the case of interleukin-1beta and interleukin-8, a significant difference was observed in the exercise groups with and without supplementation compared to the supplementation group, indicating exercise's potential effect on these factors. The interesting point is that in the group that received both exercise and the supplement, compared to the group of exercise alone or supplement alone, a significant decrease in the level of interleukin-1beta was observed.

It shows that exercise and supplements can reduce inflammatory factors by exerting synergistic effects.

Many studies have been conducted regarding the effect of exercise on the profile of inflammatory factors, which have led to sometimes contradictory results. For example, Khalafi et al. reported in a meta-analysis of 29 studies that high-intensity interval training does not have a significant effect on the level of inflammatory factors interleukin-6 and CRP protein but reduces the level of TNF-α in people with metabolic syndrome [16]. Meanwhile, another meta-analysis showed that higher-intensity training, especially when performed for more than 9 weeks, can reduce CRP levels without affecting interleukin-6 and TNF-α [17]. In a study on sedentary middle-aged people, Allen and his colleagues showed that intermittent high-intensity exercise does not affect markers of cystic inflammation[18]. However, in line with the results of our study, Gerosa and his colleagues showed that intermittent high-intensity aerobic exercise or moderate-intensity continuous exercise improves the profile of inflammatory factors in obese people [19]. Another study in the elderly population has shown that regular aerobic or resistance training reduces interleukin-8 [20]. The inconsistency of the results can be influenced by various factors such as age, gender, clinical conditions of the person (health status), and the coexistence of different training protocols. Another thing that should be considered is that inflammatory indices can change due to various factors such as drugs or psychological stress [21]. Therefore, the mentioned factors can also influence the inconsistency of the results of previous studies.

Concerning the thylakoid supplement, although the anti-inflammatory effects of this supplement have been shown, there have not been many reports on the effect of this supplement, along with different exercise protocols, on inflammatory markers in obese people. In their recent study, Saeidi and his colleagues showed that HIFT exercise protocol and Thylakoid supplementation in obese men could reduce insulin resistance and improve lipid profile and adipokines [12]. In another study, it has been shown that glycolipids from spinach that are also present in a large amount in the thylakoid, by suppressing the activity of the inflammatory factor NF-κB, the expression of interleukin-6, MCP-1, and cell adhesion molecules in vascular endothelial cells can reduce the risk of endothelial dysfunction and vascular inflammation [22]. In the experimental model on rats suffering from polycystic ovary syndrome, administration of thylakoid was able to reduce the level of TNF-α as well as malondialdehyde (an index of lipid peroxidation that increases in oxidative stress) and insulin resistance [23]. However, in this study, for the first time, the effect of combining exercise training with thylakoid supplementation on the inflammatory markers interleukin-1beta, interleukin-8, MCP-1, Sema3E, CRP, and also the anti-inflammatory factor interleukin-10 has been reported. Different mechanisms could be responsible for the enhanced anti-inflammatory effects of HIFT and thylakoid supplementation. For example, the increase in strength and muscle mass may be responsible for the beneficial effects of our interventions due to the increased production of anti-inflammatory adipokines such as adiponectin or erysin.

This mechanism has also been shown in previous studies [24]. However, in our study, the level of protective adipokines was not measured, which can provide more accurate evidence by measuring them in subsequent studies. Another mechanism responsible for the anti-inflammatory effects of HIFT and supplements is the effect on the number or function of white blood cells, especially inflammatory monocytes, which, according to past studies, have been associated with a decrease in TNF-α and CRP levels [25]. Therefore, changes in white blood cells may be responsible for some of the observed effects in our study. Studies have shown that the anti-inflammatory factor interleukin-10 can reduce the level of TNF-α and interleukin-1beta [26].

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The researchers hypothesized that combining HIFT, a form of exercise known for its effectiveness in weight loss and improving cardiovascular health, with thylakoid supplementation, a natural supplement derived from spinach that has anti-inflammatory properties, would lead to a decrease in interleukins-1beta and interleukins 8 levels in obese men [27-28].

The results of the study supported the researchers' hypothesis, showing a significant decrease in interleukins-1beta and interleukins 8 levels in the group that underwent HIFT with thylakoid supplementation compared to the control group. This suggests that the combination of high-intensity exercise and thylakoid supplementation may have a synergistic effect in reducing inflammation in obese individuals.

These findings have important implications for the management of obesity-related inflammation and associated health risks. By incorporating HIFT and thylakoid supplementation into a comprehensive weight loss and health improvement program, healthcare providers may be able to effectively reduce inflammation and improve overall health outcomes in obese individuals.

Further research is needed to better understand the mechanisms underlying the effects of HIFT and thylakoid supplementation on interleukins levels in obese individuals. However, these results provide promising evidence for the potential benefits of combining exercise and natural supplements in the management of obesity-related inflammation.

5. Conclusions

The present study showed that the HIFT exercise protocol and Thylakoid supplementation could reduce systemic inflammation markers and cardiovascular disease risk factors in obese people by showing a synergistic effect. Therefore, due to the time and place savings for HIFT exercises and the positive effects of thylakoid supplementation of inflammatory markers, the mentioned solutions can be considered in the health program to fight obesity.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Author Contributions

All authors discussed the results and contributed to the final manuscript.

Ethical considerations

The proposal for this research has been approved by the Academic Center for Education, Culture and Research Organization of Khorasan Razavi. (code of ethics IR.ACECR.JDM.REC.1402.016). This study was approved by a committee of the Tehran University of Medical Sciences and its IRCT registration number is: IRCT20240608062039N1.

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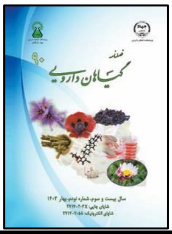

مقاله تحقیقاتی

تأثیر تمرینات عملکردی با شدت بالا همراه با مکمل تیلاکوئید بر اینترلوکین ۱ بتا و اینترلوکین ۸ در مردان چاق

حیدر عبادی‌اصل[۱]، بهمن میرزایی[۲،*]، ارسلان دمیرچی[۲]

[۱] گروه فیزیولوژی ورزشی، دانشگاه گیلان، گیلان، ایران

[۲] گروه فیزیولوژی ورزشی، دانشکده علوم ورزشی، دانشگاه گیلان، گیلان، ایران

اطلاعات مقاله

گل‌واژگان:
چاقی
تمرین عملکردی با شدت بالا
تیلاکوئید
اینترلوکین ۱ بتا
اینترلوکین ۸

چکیده

مقدمه: چاقی یک نگرانی گسترده برای سلامت عمومی با شیوع رو به رشد جهانی است که منجر به افزایش خطر بیماری‌های متابولیک مزمن می‌شود. با وجود این، تحقیقات در مورد تأثیر ورزش و مکمل بر عوامل التهابی در افراد چاق محدود است. **هدف:** این مطالعه اثرات تمرین عملکردی با شدت بالا (HIFT) و مکمل تیلاکوئید را بر سطوح اینترلوکین ۱ بتا و اینترلوکین ۸ در افراد چاق ارزیابی می‌کند. **روش بررسی:** در این مطالعه ۴۴ مرد چاق به چهار گروه کنترل (C)، مکمل تیلاکوئید (T)، HIFT (H) و ترکیبی از مکمل‌ها و ورزش (HT) تقسیم شدند. شرکت‌کنندگان پروتکل تمرین HIFT را به مدت ۱۲ هفته دنبال کردند، در حالی که گروه‌های مکمل، مکمل تیلاکوئید را برای مدت مشابه دریافت کردند. شاخص توده بدنی، بیومارکرهای التهابی از طریق نمونه‌های خون قبل و بعد از مداخله ۱۲ هفته‌ای ارزیابی شد. **نتایج:** در این گروه‌های H، T و HT، سطح فاکتورهای التهابی اینترلوکین ۱ بتا و اینترلوکین ۸ مقایسه شد. در مورد اینترلوکین-۸ تفاوت معنی‌داری در گروه H و HT نسبت به گروه T مشاهده شد. همچنین کاهش معنی داری در سطح اینترلوکین ۱ بتا در تمامی گروه‌های H، T و HT نسبت به گروه کنترل مشاهده شد (P < ۰/۰۰۱). جالب توجه است که فاکتورهای ذکر شده در هر دو گروه H و HT نیز تفاوت معنی‌داری را نشان دادند (P < ۰/۰۰۱). **نتیجه‌گیری:** یافته‌های مطالعه نشان داد که پروتکل HIFT و استفاده از مکمل‌های تیلاکوئید می‌تواند با نشان دادن اثر هم‌افزایی، شاخص‌های التهابی سیستمیک را در مردان چاق کاهش دهد. بنابراین ورزش HIFT با مکمل‌های تیلاکوئید را می‌توان راهی موثر برای کاهش التهاب در افراد چاق در نظر گرفت.

مخفف‌ها: HIFT، تمرین عملکردی با شدت بالا؛ C، گروه کنترل؛ T، گروه مکمل تیلاکوئید؛ H، گروه تمرین عملکردی با شدت بالا؛ HT، گروه مکمل تیلاکوئید به همراه تمرین عملکردی با شدت بالا؛ WHO، سازمان بهداشت جهانی؛ MASLD، بیماری استئاتوز کبدی مرتبط با اختلال متابولیک؛ BMI، شاخص توده بدن؛ CRP، پروتئین واکنشیC؛ TNF-α، فاکتور نکروز تومور α؛ IL-6، اینترلوکین ۶؛ WAT، بافت چربی سفید

* نویسنده مسؤول: mirzaei@united-world-wrestling.org

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