

Research Paper

Interaction Effect of Combined Exercise and Supplementation With Portulaca Oleracea on Liver Enzymes in Obese Postmenopausal Women With Non-Alcoholic Fatty Liver Disease



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ABSTRACT

Objective Regular physical activity and the use of portulaca oleracea may be effective in treating liver disease. The purpose of this study was to assess the response of liver enzymes to both exercise and supplementation with Portulaca oleracea in obese postmenopausal women with Non-Alcoholic Fatty Liver Disease (NAFLD).

Methods Forty obese women with NAFLD were randomly divided into four groups of supplementation (n=10), combined exercise (n=10), placebo (n=10), and supplementation + exercise (n=10) after signing an informed consent form. Portulaca oleracea supplementation was taken as a 500 mg capsule daily before lunch and dinner. Combined exercise was performed for 12 weeks, 3 sessions per week each for 90 minutes. Liver enzymes were measured before and after the intervention. For statistical analysis, paired t-test and ANCOVA were used with a significance level set at $P < 0.05$.

Results Combined exercise and portulaca oleracea supplementation significantly reduced the levels of Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) enzymes in the groups exercise + supplement, exercise, and supplement. There was a significant difference between the exercise + supplement and placebo groups and between placebo and exercise groups ($P < 0.05$).

Conclusion Consumption of portulaca oleracea and combined exercise can decrease the serum levels of liver enzymes in women with NAFLD, which can be effective in treatment of patients with this disease.

Extended Abstract

1. Introduction

One of the most important diseases that is more strongly associated with obesity is Non-Alcoholic Fatty Liver Disease (NAFLD) [1, 2]. Elevated plasma levels of enzymes secreted from the liver into the blood are associated with fatty liver. Regular physical activ-

ity and the use of portulaca oleracea supplementat may be effective in treating liver disease. This study aimed to examine the interactive effect of combined exercise and portulaca oleracea supplementation on liver enzymes in obese postmenopausal women with NAFLD.

2. Materials and Methods

40 obese women with NAFLD were randomly divided into four groups of supplementation (n=10), combined

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exercise (n=10), placebo (n=10), and supplementation + exercise (n=10) after signing an informed consent form. *Portulaca oleracea* supplementation was taken as a 500 mg capsule daily before lunch and dinner. Combined exercises included aerobic exercise with a intensity of 60-80% of maximum heart rate [3, 12] and resistance training with a intensity of 40-60 percent of one repetition maximum, in 3 sets of 8-12 repetition, and a 3-min rest interval [13], performed for 12 weeks, 3 session per week, each for 90 min. Liver enzymes were measured before and after the intervention. The subjects' diets were also monitored under the supervision of a nutritionist by a oral reminder form one week before exercise until the end of the study. For statistical analysis, paired t-test and ANCOVA were used with a significance level set at $P < 0.05$.

3. Results

The Shapiro-Wilk test was used to check the normality of the data. Test results showed that the data were normal. Therefore, parametric tests of paired t-tests and ANOVA were used. The results of the paired t-test showed that after 12 weeks of intervention, serum level of alanine aminotransferase (ALT) in the exercise + supplement group ($P=0.00$), exercise group ($P=0.00$), and supplement group ($P=0.00$) was significantly reduced as well as the serum level of aspartate aminotransferase (AST) in the exercise + supplement group ($P=0.00$), exercise group ($P=0.000$), and supplement group ($P=0.001$); and the serum level of Alkaline Phosphatase (ALP) in the exercise + supplement

group ($P=0.01$), exercise group ($P=0.002$), and supplement group ($P=0.001$). The results of the ANCOVA showed that, with 95% confidence level, the combined exercise and supplementation with *portulaca oleracea* had a significant effect on the level of liver enzymes ALT and AST, but its effect on the ALP level was not significant after intervention ($P=0.21$) (Table 1).

4. Discussion

The type of used sports activities has different effects on the secretion and metabolic systems. Long-term endurance training whose energy production is more aerobic affect the activity of AST and ALT enzymes, because to continue this type of activity, there is a greater need for energy production through the aerobic system. Resistant training increases lipid oxidation, insulin sensitivity, and basal metabolic rate. Therefore, it may be possible to reduce the level of ALT enzyme (longer half-life and its maximum in liver tissue) and decrease the level of AST enzyme (shorter half-life) by increasing basal metabolic rate and lipid oxidation [16].

5. Conclusion

Portulaca oleracea inhibits lipid peroxidation by having many antioxidant properties and omega-3 and omega-6 fatty acids. This property is applied by breaking the existing oxidizing structure by cytochromes p450 and neutralizing free radicals (they damage hepatocytes and increase the activity of Cytosolic enzymes which Indicates the extent and

Table 1. Mean±SD of three liver enzyme levels and the results of paired t-test and ANCOVA

Variable	Group	n	Mean±SD		Paired t-test Sig.	ANCOVA	
			Pre-test	Post-test		F	Sig.
ALT (IU/L)	Exercise + supplement	10	40.60±12.25	23.0±4.87	0.00*	26.392	0.00**
	Placebo	10	53.0±20.03	52.90±19.85	0.34		
	Exercise	10	45.00±14.69	33.10±10.39	0.00*		
	Supplementation	10	52.10±20.95	43.3±17.76	0.00*		
AST (IU/L)	Exercise + supplement	10	42.50±17.25	33.70±13.75	0.00*	27.204	0.00**
	Placebo	10	54.30±14.87	54.0±14.78	19.0		
	Exercise	10	40.0±12.93	34.80±11.84	0.00*		
	Supplementation	10	50.0±20.23	43.2±16.13	0.003*		
ALP (IU/L)	Exercise + supplement	10	246.2±52.47	217.4±43.81	0.01*	6.750	21.0
	Placebo	10	236.1±41.55	235.9±41.21	0.34		
	Exercise	10	240.20±66.47	230.4±65.75	0.002*		
	Supplementation	10	234.2±48.14	224.9±46.43	0.001*		

* Significant difference between pre-test and post-test results ($P < 0.05$); ** Significant difference between groups at post-test phase ($P < 0.05$)

type of liver damage) [8]. Therefore, due to the antioxidant properties of portulaca oleracea, the decrease in liver enzyme activity is predictable.

Ethical Considerations

Compliance with ethical guidelines

This study obtained its ethical approval from the Research Ethics Committee of Islamic Azad University of Rasht Branch (Code: IR.IAU.RASHT.REC.1397.034) and is a clinical trial registered by Iranian Registry of Clinical Trials (Code: IRCT.20190309042987.N1).

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Authors' contributions

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Conflicts of interest

The authors declare no conflict of interest.