

Effects of L-Carnitine (Neutraceutical) In Weight Management among Overweight and Obese Adults of Age between 20 – 45yrs – A Comparative Study in Chennai and Tirupathi

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Abstract- Obesity is a global epidemic disease and is recognized as a major public health problem in India. Urbanization, Improved economical status, modernization and sedentary life style are some of the factors thought to underlie the epidemic. There is immediate need to treat the issue as Obesity is the major causative factor for many non-communicable diseases. The important strategies for weight management would be diet and Physical activity. But recently many other treatments evolved like behavior modification, weight loss nutritional supplements, non clinical weight management programs, medically managed weight-loss and surgical treatment. L-Carnitine, a vitamin like substance naturally synthesized in our body has gained much importance as weight loss nutritional supplement in treating Obesity as L-carnitine plays an important role in our body to transport fatty acids for its oxidation. As any other vitamin L-Carnitine is also naturally present in foods and the most in animal foods. Hence the study was undertaken to compare the rate of weight loss among overweight and obese individuals after supplementation of L-Carnitine (1000mg/day) for 30 days.

Index Terms- Obesity, Weight management, Overweight, L-Carnitine, Weightloss.

I. INTRODUCTION

L-Carnitine, (gamma-trimethylamino-hydroxybutyric acid), is a small-polar molecule and a quaternary amine. L-Carnitine is naturally occurring in all mammalian species and is found in almost all cells. The human pool of L-Carnitine is around 20g with 98% of this within the cardiac and skeletal muscle pool, 1.4% in the liver and kidney, and 0.6% in extracellular fluid. In 1905 L-Carnitine was isolated for the first time from muscle tissue; its structure was established in 1927. L-Carnitine was shown to be an essential nutrient for a meal worm (*Tenebrio molitor*) and was therefore called vitamin B_T.

L-Carnitine is supplied to the body through both endogenous synthesis and food intake. The human body synthesizes about 20mg of L-Carnitine every day. The major sites of L-Carnitine biosynthesis are the liver and kidneys. This process requires two essential amino acids, protein bound lysine and methionine, plus vitamin C, iron, Vitamin B6 and niacin and involves a series of enzymatically catalyzed reactions. The need

for all these essential nutrients implies that malnutrition has a highly negative impact on L-Carnitine biosynthesis.

II. SOURCES

For the most part, however the daily L-Carnitine requirement is met by food intake. Products of animal origin contain reasonable amounts of this nutrient, whereas foods of plant origin contain only very little, if any L-Carnitine.

TABLE 1: L-Carnitine content in selected foods (mg/100g)

Foods of Animal Origin (uncooked)	L- Carnitine (mg/100g)	Foods of Plant Origin (uncooked)	L-Carnitine (mg/100g)
Lamb	190	Mushroom	2.6
Beef	143	Carrot	0.4
Pork	25	Bread	0.4
Poultry	13	Rice	0.3
Fish	3 to 10	Banana	0.1
Egg	0.8	Tomato	0.1

Source: CARNITINE MIRACLE

IMPORTANT FUNCTION OF L-CARNITINE:

Whenever our body requires energy the fatty acids are released from VLDL and chylomicrons which are transferred to the cell with the help of L-Carnitine. The fatty acids after reaching the cell requires a medium to enter mitochondria where β -oxidation takes place. L-Carnitine acts as a medium for to pass the mitochondrial membranes. Hence when a person is Obese or overweight and want lose weight L-Carnitine will be helpful. That is when an obese person undergoes a physical activity he body demand energy, L-Carnitine will help to immediately transfer fattyacids to muscle for production of energy.

L-Carnitine though synthesized in the body the studies show that with age the rate of synthesis declines but still there are no much research studies to prove this. Hence if body is not able to synthesize sufficient amount of L-Carnitine the person will not be able to produce energy from fatty acids, This could cause deficiency of L-Carnitine in humans. Even vegetarians are more prone to get L-Carnitine deficiency as the richest source being non-vegetarian foods. Hence taking L-carnitine dietary

supplements will aid a weight loss program along with Balanced diet and physical activity. Many studies show that 6g/day of L-Carnitine intake is safe. But this requirement is for elite athletes whose requirements are higher. An obese sedentary person who is doing regular physical activity can take up to 2g/day. The richest sources being non-vegetarian foods. The L-Carnitine can be isolated from vegetarian sources and can be taken as a supplement. Hence the study was taken to hypothesize the effects of L-Carnitine on weight management.

According to 2010 WHO study on Prevalence of Overweight and Obesity (BMI \geq 25 KG/m²) among females Age 15+ is 18% in India and among males who are of age 15+ is 20.1%. According to Obesity Foundation India (2011) study report, In Indian scenario, even with the growing awareness about health and fitness, more than 3 percent (3 Crores) of the Indian population are obese and more than 25% of Indians are overweight. It has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. Hence the study was conducted with an objective to study the Obesity management with the help of dietary supplement L-Carnitine.

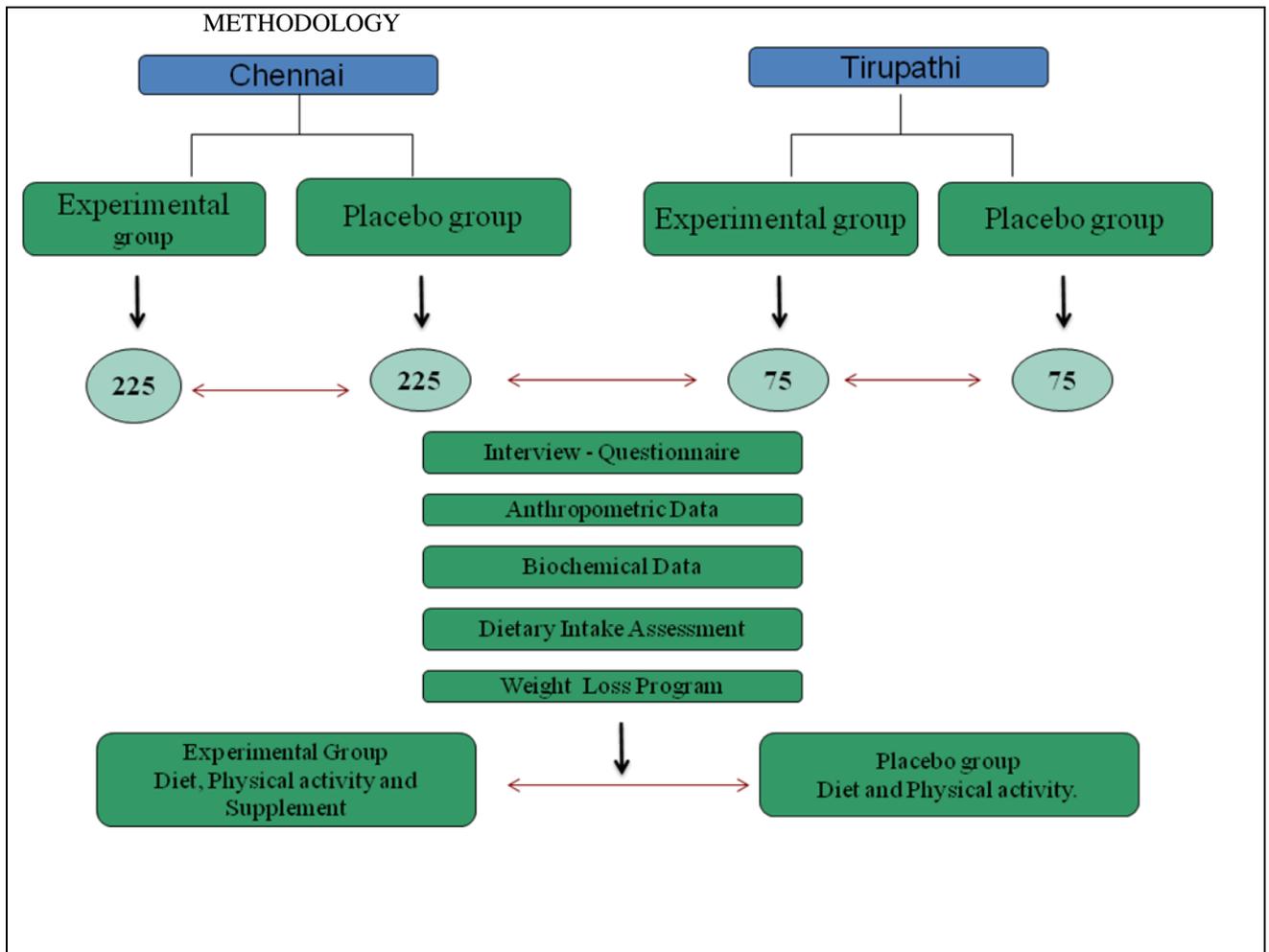
III. MATERIALS & METHODS

The rate of weight loss among Overweight and Obese adults after supplementation by L-Carnitine was assessed by cross-sectional, correlation and experimental study methods. The study was conducted among subjects who are of age group 18-45

years. The ethical approval was obtained from ethics committee and informed consent was obtained from all subjects. Totally 600 subjects were invited for the study from two different states by stratified sampling methods. The total number of study subjects were divided into 4 parts of which 3 parts (450 subjects) of the study subjects were from Chennai, a metropolitan city of Tamil Nadu and one part (150 subjects) of the subjects were chosen from Tirupathi, a small town in Chittoor District of Andhra Pradesh.

Tools And Techniques: In each of the two cities the subjects were divided into two groups, one Experimental group and the other placebo group. In Chennai, of the 450 subjects 225 were classified as Experimental and 225 as placebo group. In the city of Chennai the prevalence of Obesity is high according to a study by Mishra people do regular physical activity by going to gyms, hence subjects were randomly chosen who regularly visit gyms for their daily workouts. In Tirupathi of 150 subjects 75 were classified as placebo and 75 subjects as placebo group. Both the groups were assessed for Nutritional Status by a Questionnaire and Anthropometric tools. After assessment both the groups were put on a weight loss program for 30 days. After 30 days again the Anthropometric data was collected for the subjects. For 30 days the Weight loss program for experimental groups included Diet, Physical activity and Dietary supplementation of L-Carnitine (1g per day) whereas for placebo groups the weight loss program includes Diet and physical activity but no supplementation. The data was then statistically analyzed

Table: 1The Distribution of study samples in the city of Chennai and Tirupathi town and Assessment process.



above table showed that the prevalence of Obese and Overweight subjects among placebo group in Chennai was 38.2% and 61.8% and in Tirupathi was 30.7% and 69.3%. The prevalence of Obese and Overweight among experimental group in Chennai was 37.6% and 62.4% whereas in Tirupathi was 38.7% and 61.3%.

IV. RESULTS & DISCUSSIONS

PREVALENCE OF OBESITY AND OVERWEIGHT:

The statistical analysis was done and the values were interpreted. First the prevalence rate was studied. The analysis from the

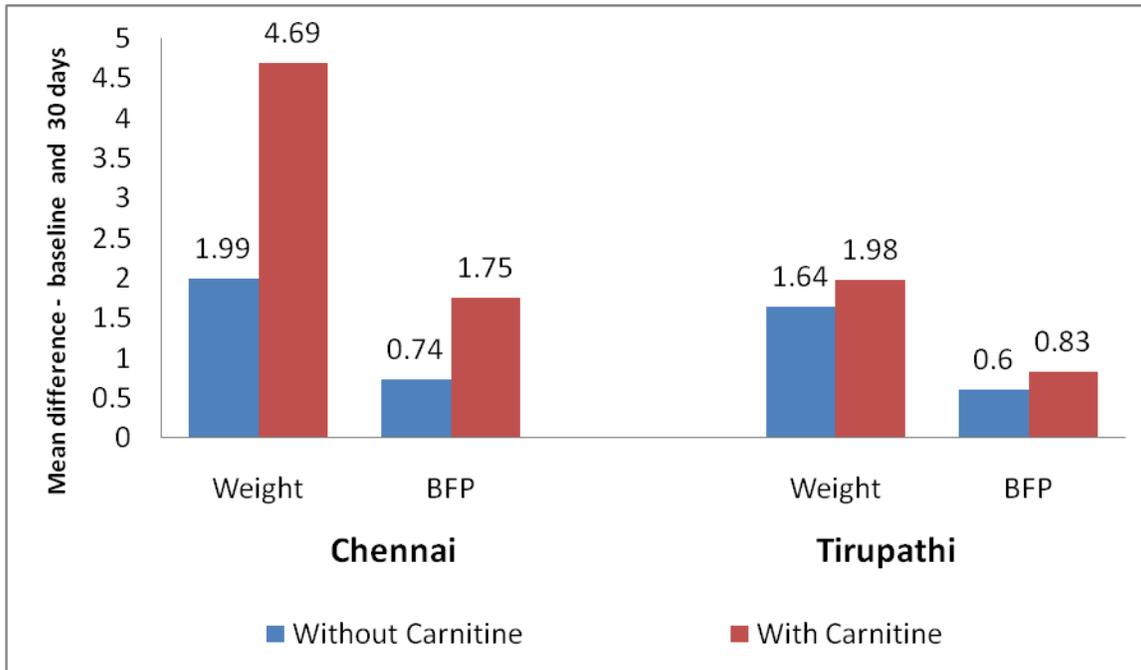
TABLE: 3. DISTRIBUTION OF OBESE AND OVERWEIGHT SUBJECTS WITH RESPECT TO PLACEBO AND EXPERIMENTAL GROUP.

Crosstab

Centre	OBESE. OW			Carnitine		Total
				0 without	1 with	
1 Chennai	OBESE.	1 Obese	Count	84	88	172
			column %	38.2%	37.6%	37.9%
	OW	2 OW	Count	136	146	282
			column %	61.8%	62.4%	62.1%
Total			Count	220	234	454
			column %	100.0%	100.0%	100.0%
2 Tirupathi	OBESE.	1 Obese	Count	23	29	52
			column %	30.7%	38.7%	34.7%
	OW	2 OW	Count	52	46	98
			column %	69.3%	61.3%	65.3%
Total			Count	75	75	150
			column %	100.0%	100.0%	100.0%

COMPARISON OF WEIGHT AND BFP WITH RESPECT TO PLACEBO AND EXPERIMENTAL GROUP:

FIGURE 1: DISTRIBUTION OF WEIGHT AND BFP BEFORE AND AFTER L-CARNITINE SUPPLEMENTATION



The above figure explains the weight loss and loss of body fat percentage in the subjects among placebo and experimental groups. The statistical analysis showed that the mean difference of weight loss was significantly high among experimental group of Chennai who had taken supplement L-Carnitine than experimental group in Tirupathi. The results showed that L-Carnitine dietary supplement had increased weight loss by increasing fatty acid oxidation. The Body fat percentage did not change much before and after supplementation among experimental group and placebo groups in each of the two cities independently. But comparatively the loss of fat (BFP) was more among the experimental group in Chennai than the experimental group of Tirupathi. The reasons could be the physical activity level, as in Chennai most of the subjects go to gyms regularly than in Tirupathi who only walk for 30 – 45 minutes. The rate of weight loss could be more when the VO2 max (Heart rate) is above normal that happens when a person runs on a tread mill than a person who walks.

V. CONCLUSIONS

From the statistical analysis it can be concluded that L-Carnitine, a dietary supplement when taken by overweight and obese subjects will reduce more weight. But this will work only when the person does any physical activity. The obese and overweight subjects who are doing regular physical activity require extra L-Carnitine for the transport of fatty acids which are used for energy production. But large scale studied may be required to prove this. But the experimental group especially those above age 30 lost more weight when given L-Carnitine supplement than among the control group. The reason could be

that after age of 30 the endogenous synthesis of L-Carnitine declines, but again this requires extensive research study. As L-carnitine is mostly available in animal products, vegetarians need to get supplemented or they should regularly take amino acids lysine and methionine that produce L-Carnitine in the body. L-Carnitine is considered as important vitamin as it has many other health benefits apart from fatty acids transportation and oxidation. Recently L-Carnitine is gaining importance even in sports nutrition as a supplement during sports training adue to its property for oxidation of fats which serve as a fuel for long duration trainings.

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