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**SUPPLEMENTATION WITH L-CARNITINE (NUETRACUTICAL) CAUSES MAXIMUM WEIGHT LOSS****Kalpana\* and Aruna**

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\*Corresponding Author: [kalpanaprasad\\_ks@yahoo.co.in](mailto:kalpanaprasad_ks@yahoo.co.in)**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. 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. Study was undertaken to compare the rate of weight loss among different age groups categorized who are overweight and obese after supplementation of L-Carnitine (1000mg/day) along with a physical activity program for 30 days. The study showed that the maximum weight loss (4-5KG) was among the age group 20 – 30 years and least weight loss was among the group greater than forty years. The reasons for maximum weight loss among this group could be age, increased Basal Metabolic rate (BMR), portion control, regular intake of supplement, customized diets, life style variability and regular physical activity especially weight training. Of the total study population it was observed that 62% were Overweight (OW) and 38% were obese. It was statistically analyzed that 55% of the study population were among the age group 20 -30 (years) and the maximum weight loss of 4 -5 kg was observed among this age group.

**Key words:** Obesity, physical activity, Overweight, L-Carnitine, weight loss, age and factors.**INTRODUCTION**

Obesity is a chronic epidemic disease, prevalent globally among the affluent and sedentary subjects and affects the young and the old equally. According to 2010 WHO study on Prevalence of Overweight and Obesity (BMI  $\geq$  25 KG/m<sup>2</sup>) 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; more than 25% of Indians are overweight. More than 5% of urban adults are obese and more than 15% of urban children are overweight.

The pressure to lose weight seems to be mounting these days due to the way Hollywood actors and actresses look. Common Weight loss dietary supplements have been developed to help people lose weight faster while they exercise for effective weight loss challenge. Many botanical and other types of dietary supplements are purported to be useful for stimulating or enhancing weight loss. One such substance that is being used for weight loss as dietary supplements is L-carnitine. The use of this nutrient as dietary supplement for fat reduction has become quite common as it has an important function of oxidation of fatty acids in the body. The carnitine synthesis takes place mainly in liver and kidney. The same has been studied by Ramalakshmi (2007) showed that the carnitine

deficiency is higher after age of 40years and was more prevalent among patients suffering from Kidney diseases. Robert Crayhon and Rebouche.CJ studied separately that L-Carnitine helps to use body fat for producing energy and thereby lowers blood fat levels. According to him carnitine also promotes heart health. Hence a double blind experimental study was conducted among 300 subjects who were are controlled personalized diet, physical training and supplementation with L-Carnitine (1000mg/day) for 30 days.

**L-CARNITINE AS A CONDITIONALLY ESSENTIAL NUTRIENT**

L-Carnitine, (gamma-trimethylamino—hydroxy-butyric 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<sub>T</sub>.

By the 1960s the essential role of L-Carnitine in the utilization of long chain fatty acids for energy was confirmed, and the latest research has found that L-Carnitine can actually increase fatty acid oxidation in

healthy adults. Numerous clinical studies have reported upon the beneficial effects of L-Carnitine supplementation.

Odo and Tanabe (Feb 2013) showed that of 24 overweight Japanese males (BMI 25.8 - 26.6 kg/m<sup>2</sup>) twelve when given L-carnitine supplement (500mg/day) and along with motivational training program were able to lose more weight compared to the control group without the supplement. The aim of this study was to critically assess the evidence from rigorous clinical trials on the effectiveness of dietary supplements L-carnitine in reducing body weight.

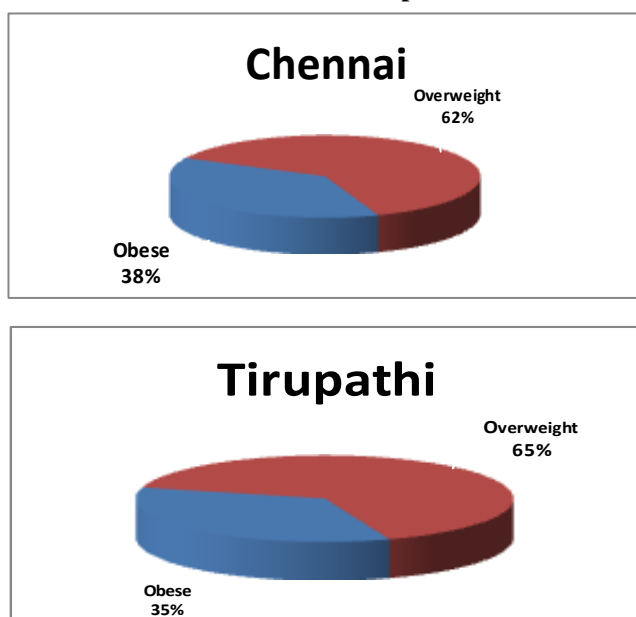
## MATERIALS AND METHODS

A cross sectional, experimental and complete randomized block study was done to study the effect of L-Carnitine on weight loss. The study was conducted in two different parts of the country. One part of the study was conducted in the city of Chennai and second part of the study was conducted in Tirupati, Chittoor District. The study was conducted among subjects who are of age group 18-45 years. Totally six hundred subjects were chosen for the study from the two geographical areas. Of which 3/4<sup>th</sup> of the subjects (450) were from Chennai and 1/4<sup>th</sup> (150) were from Tirupati. In each of the geographical area the study population was divided into two group's one experimental and other control group. The Nutritional assessment was done before and after the study. Both the groups were put on 30 days weight management program along with physical activity. But only experimental group was given supplement L-Carnitine (1000mg/day) for 30 days. The results obtained were studied and interpreted.

## RESULTS & DISCUSSIONS

### COMPARISON OF OBESE AND OVERWEIGHT SUBJECTS IN BOTH CHENNAI AND TIRUPATHI

**Figure1- Prevalence Of Obesity and Overweight In Chennai And Tirupathi**

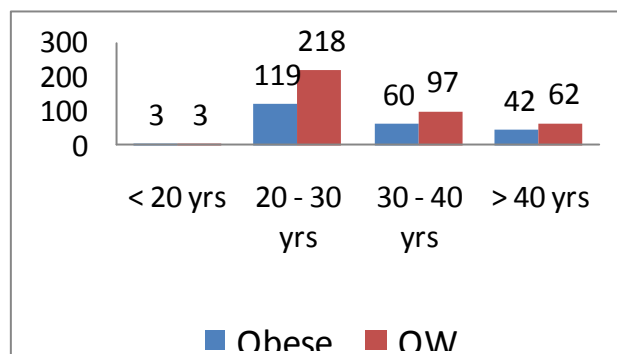


From the study population, the distribution of Obesity and Overweight subjects in the city of Chennai and Tirupati were studied. In Chennai, the prevalence of Overweight and Obesity rates were 62% and 32% and in Tirupathi the prevalence of Overweight and Obesity were 65% and 35% among the study population. The ratio of Overweight and Obesity was slightly higher in the city of Chennai from Tamil Nadu state than compared to Tirupati town in Andhra Pradesh. This shows that Obesity was becoming epidemic. The Obesity rate was highest in the urban areas and the reasons could be due to availability of more calorie dense foods like pizza, burger and bakery foods. The obesity which was once epidemic in urban areas is now affecting towns and rural population too. The socio-economic transition, Urbanization, sedentary life style and availability of more processed foods could be one of the reasons for obesity.

According to 2010 WHO report on Prevalence of Overweight and Obesity (BMI  $\geq$  25 KG/m<sup>2</sup>) among females Age 15+ is 18% in India and among males who are of age 15+ is 20.1 %. In the AC Nielsen survey, commissioned by Pharma Company Johnson and Johnson, found that Chennai is top among the cities surveyed with the largest number (38%) of obese/overweight people. Tamil Nadu comes fourth in the list of states, after Punjab, Goa and Rajasthan, according to Rajkumar Palanippan<sup>2</sup> (2012). In Tirupati, Andhra Pradesh the prevalence of Obesity is very less (2% women and 6% men) compared to the city of Chennai, the same has been studied by Vekataraman et co-workers<sup>3</sup> (2005).

### COMPARISON OF OBESE AND OVERWEIGHT SUBJECTS WITH RESPECT TO AGE GROUPS

**Figure 2: Distribution of Study samples according to the age groups**

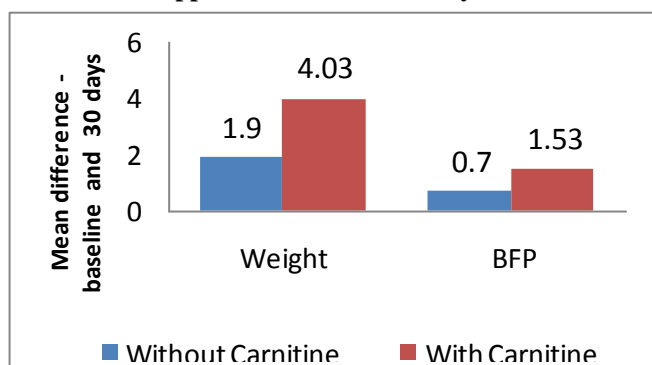


The above table shows total number of subjects who are obese and overweight for each categorized age group. The total number of subjects below 20 years of age were 6 (100%) of which 50% (n=3) are Obese and 50% (n=3) are Overweight. Between age group 20 -30, the total number of study subjects were 337 of these 35.3% (n=119) were Obese and 64.7% (n=218) were Overweight. Between the age group 30-40 years the total number of study population were 157 of which 38.2% (n=60) were obese and 61.8% (n=97) were overweight. Among the age group >40 the total study population were 104 of which

40.4% (n=42) were Obese and 59.6% (n=62). From the above study it was observed that the subjects of age 20-40 years had the highest prevalence of overweight subjects than obese subjects.

**COMPARISON OF WEIGHT AFTER 30 DAYS AMONG CONTROL AND EXPERIMENTAL GROUP**

**Figure 3: Distribution of Weight After Supplementation For 30 Days**



The above analysis showed that the average weight and the Body Fat Percentage (BFP) had significantly reduced among the groups. The average loss of weight among experimental groups was 4.03kg compared to control group which was only 1.9kg. The experimental groups were able to lose 2 kg more weight than the control group. From the above analysis it can be analyzed that L-Carnitine can be taken as a dietary supplement for weight loss. The reduction of body fat among experimental group was significantly higher than control group by 1%.

Kamal et Mohamed<sup>7</sup> (2009) did a study in 10 rats who were fed a normal basal diet and 30 rats fed a high-fat diet (HFD) for 14 weeks during the entire study. The data showed that HFD induced obesity among 30 associated with a disturbed lipid profile and defective antioxidant stability; this may have implications for the progress of obesity related problems. Treatment with L-carnitine improved obesity and significantly normalized the lipid profiles.

**COMPARISON OF WEIGHT AND BODY FAT PERCENTAGE AMONG DIFFERENT AGE GROUPS IN CHENNAI AND TIRUPATI BY PAIRED T-test**

**Table: 1- Distribution of weight and BFP among different age groups Group Statistics**

Centre	Age		Carnitin	N	Mean	SD
Chennai	<20 years	Wt loss kilos	Without	4	2.50	0.577
			With	2	4.50	0.707
		BFP after 30 days	Without	4	31.743	6.755
			With	2	32.328	12.33
	20-30	Wt loss kilos	Without	135	1.98	0.876
			With	130	4.58	1.339
		BFP after 30 days	Without	135	27.949	5.066
			With	130	27.141	5.005
	30-40	Wt loss kilos	Without	46	2.09	0.865
			With	65	4.91	1.259
		BFP after 30 days	Without	35	1.86	0.944
			With	37	4.70	1.372
>40 years	Wt loss kilos	Without	35	1.86	0.944	
		With	37	4.70	1.372	
	BFP after 30 days	Without	35	29.522	6.779	
		With	37	32.014	5.103	
Tirupathi	20-30	Wt loss kilos	Without	46	1.57	1.003
			With	26	2.00	5.895
		BFP after 30 days	Without	46	27.358	4.587
			With	26	28.859	5.895
	30-40	Wt loss kilos	Without	22	1.82	0.957
			With	24	2.06	1.046
		BFP after 30 days	Without	22	29.358	6.3011
			With	24	29.807	5.411
	>40 years	Wt loss kilos	Without	7	1.57	0.535
			With	25	1.88	1.130
		BFP after 30 days	Without	7	34.103	5.435
			With	25	34.229	4.880



From the above table it can be concluded that Chennai had highest study population of Overweight and obesity and among them the weight loss was maximum of 4.58kg. Whereas in Tirupati the maximum weight loss was only 2kg (50% less than Chennai population who lost weight). The population of age group 20 -30 years had maximum weight loss and studies show that BMR of the Chennai population was the highest and the reasons could be that the Chennai population had been regularly doing physical activity in fitness centers. They were on cardio training which will cause a rise in Basal Metabolic Rate. Whereas in Tirupati, the study population (100%) were going for walk as part of the program. The less availability of fitness centers or unawareness about fitness, Dietary supplements for weight loss and obesity associated health complications are some of the reasons that reduced weight loss among this group. Alexandra M Johnstone<sup>22</sup> (2005) had studied that Fat mass and Fat free mass are the significant contributors to BMR. According to the study if the fat mass is reduced the Basal Metabolic Rate will be increased. And from this it is understood that L-Carnitine is necessary for fatty acids oxidation and a physical

activity will use fats for energy production and causes a reduction in body weight and Body fat percentage.

**COMPARISON OF WEIGHT AND BODY FAT PERCENTAGE AMONG DIFFERENT AGE GROUPS BY INDEPENDENT SAMPLE TEST**

The below table showed the sample t-test for variables weight and body fat and it is evident that the significant weight loss was among the age group of 20 – 40 years. Though the test showed significant weight loss among the age group above 40 years, since the study population in this age group is very less (15%) the values obtained may not be significant, but a extensive study among this group is needed. The maximum weight loss among 20 -40 years age could be due to BMR, which reduces with age. Physical activity is the key factor that can also regulate BMR. Normal Fat mass can be maintained by regular physical activity and by avoiding carnitine deficiency by supplementation which in turn causes increased BMR.

**Table: 2 –Comparison of Weight and BFP by Independent sample T-test Independent Samples Test**

Centre	Age		t- test for equality of		
Chennai	<20 years	BFP after 30 days	-0.80	4	0.940
		20-30	Wt loss kilos	-18.63	221
	30-40	BFP after 30 days	1.350	263	0.193
		Wt loss kilos	-13.15	109	0.001
	>40 years	BFP after 30 days	-0.407	109	0.685
		Wt loss kilos	-10.30	64	0.001
Tirupathi	20-30	BFP after 30 days	-1.786	70	0.081
		Wt loss kilos	-1.686	70	0.096
	30-40	BFP after 30 days	-0.769	70	0.444
		Wt loss kilos	-0.843	44	0.404
	> 40 years	BFP after 30 days	-0.260	44	0.796
		Wt loss kilos	-0.695	44	0.796
		Wt loss kilos	-0.059	30	0.954

**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 along with regular physical activity. 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. The significant weight loss was observed among the experimental group who were of age group 2- -40 years and taking L-carnitine supplementation. The maximum weight loss was among the Chennai population. The factors influencing weight loss could be that after age of thirty the endogenous synthesis of L-Carnitine declines (so supplementation helps), Increased BMR by regular physical activity at gyms and controlled diets. 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 an 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 due to its property for oxidation of fats which serve as a fuel for long duration trainings.

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