

## Effects of Yoga on “Leptin-The Satiety Hormone” In the Fight against the Global Threat-“Obesity”

Dr. Gayathri Dilliraj<sup>1\*</sup>, Dr.B.Shanthi<sup>2</sup>, Dr.V.S.Kalai Selvi<sup>3</sup>

<sup>1</sup>Tutor; Department of Biochemistry, Sree Balaji Medical College & Hospital, Chrompet, Chennai India

<sup>2</sup>H.O.D, Professor, Department Of Biochemistry, Sree Balaji Medical College & Hospital, Chrompet, Chennai India

<sup>3</sup>Professor, Department Of Biochemistry, Sree Balaji Medical College & Hospital, Chrompet, Chennai India

\*Corresponding author: Dr. Gayathri Dilliraj

| Received: 13.02.2019 | Accepted: 23.02.2019 | Published: 28.02.2019

DOI: [10.36347/sajb.2019.v07i02.005](https://doi.org/10.36347/sajb.2019.v07i02.005)

### Abstract

### Original Research Article

**Background:** According to the WHO, Obesity is one of the commonest, yet among the most neglected stigmatized, public health problem of this century. In the adipose tissue which is a highly metabolically active tissue, the Adipokines (Leptin, Adiponectin, etc) have been proved to play a significant role. Yoga has been used as one of the simplest, cost effective tools in the treatment of obesity in the global scale. **Aim & objective:** To establish the effects of yoga (suryanamaskar) on influencing the metabolic activity of Adipokine (leptin) & its potential against obesity. **Methods:** It is a hospital based Correlative Study carried out in S.B.M.C.H, the purpose of which was to analyse the effects of yoga on serum leptin levels in the obese. 30 obese student volunteers in the age group of 17-19yrs without any known complications were selected as subjects. Before and after the yoga training (i.e after four weeks of yoga) we measured their serum leptin levels by ELISA in the central laboratory. **Results:** Decrease in leptin levels & decrease in their body mass index with a little balanced satiety levels were seen after practising yoga over a period of time. Thus the significant potential of yoga on the serum leptin levels has been proved in accordance with various other earlier studies. **Conclusion:** From this study it was concluded that, longer term/more intensive regular yoga practise does have beneficial health consequences against obesity by decreasing the serum leptin levels significantly?

**Keywords:** Obesity, Serum Leptin, Yoga.

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## INTRODUCTION

Obesity represents a major health threat & socio-economic problem in the global scale. Amidst the various known preventable leading causes of deaths in children & adults universally, obesity and overweight are the simplest causes that top the list. According to the WHO, it is one of the most prevalent, yet among the most neglected problem in both the developed & developing countries of this century. Childhood obesity & obesity in teens has more than tripled in the past 30 yrs [1]. Obesity has become a natural consequence of normal kids with normal genes being raised with unhealthy eating habits in sedentary, technology dominated society. It has chiefly become a major public health & policy problem not only in India but also universally, because of its generalised prevalence, cost and health effects.

Among the various known Adipokines which are basically cytokines (cell signalling proteins) secreted by the adipose tissue -“The energy expenditure hormone –Leptin” plays a very crucial role in appetite & the various significant metabolisms like the

carbohydrate metabolism, the protein metabolism & the lipid metabolism [2]. It chiefly serves as one of the vital obesity marker hormones. Leptin was also the first adipokine to be discovered in 1994 derived from the greek word “leptos” which basically means thin. Leptin, which is a neurotransmitter used by the brain, chiefly helps to regulate the amount of body fat mass by altering the fat metabolism pathway accordingly & checks the energy balance by inhibiting hunger and by counter checking the energy consumption of an individual[2]. It is also said to be responsible for additional functions like decreasing glucose stimulation, decreasing insulin secretion, increases the heart rate, regulates bone mass, regulates the menstrual cycle, activation of immune cells, increases the blood pressure, helps regulate the synthesis of thyroid hormones etc which are still being studied. Leptin is secreted chiefly from the fat cells (white adipose tissues) of our body. Various minor alternate sources like the ovaries, brown adipose tissue, skeletal muscle, placenta, stomach, mammary epithelial cells pituitary gland, bone marrow, and the liver also produce negligible amount of letin and its levels are correlated

with body fat percentage [2]. Leptin levels decreases whenever the body fat levels falls, and appetite is stimulated; and the exact opposite mechanism occurs when fat mass rises. In this way leptin is said to help maintain the normal body weight.

Yoga an ancient Indian system of exercise & therapy has been used as the simplest cost effective tool in treating diverse health problems including obesity in the global scale. Suryanamaskar also known by the alternative name sun salutation comprises of twelve asanas that symbolises the sun as the powerful source and the soul of all forms of life. The twelve poses of the suryanamaskar are:

- Step 1: Prayer poses (Pranamasana)
- Step 2: Raised arm pose (Hastauttanasana)
- Step 3: Hand to foot pose (Hasta Padasana)
- Step 4: Equestrian pose (Ashwa Sanchalanasana)
- Step 5: Stick pose (Dandasana)
- Step 6: Salute with eight parts (Ashtanga Namaskara)
- Step 7: Cobra pose (Bhujangasana)
- Step 8: Mountain pose (Parvatasana)
- Step 9: Equestrian pose (Ashwa Sanchalanasana)
- Step 10: Hand to foot pose (Hasta Padasana)
- Step 11: Raised arms pose (Hastauttanasana)
- Step 12: Standing mountain pose (Tadasana)[3]

In general it is an isotonic, moderate physical exercise which is linked with breathing that consumes calories moderately. It's not associated with much of fatigue, & it's relatively simple without much of exhaustion [3]. It is characterised by only the increase in metabolic rate, there is comparatively no big, relative change in tension thus it can be classified as an isotonic exercise. It is said to mobilize the stored/accumulated fat by increasing the blood circulation.

### Aim and objectives

The main aim of this simple study was to evaluate & establish the effects of one month of yoga practise (suryanamaskar) on influencing the metabolic activity of Adipokine (leptin) & its potential against obesity in the obese study group. Various previous studies have proved that Leptin regulates energy balance by suppressing an appetite stimulating hormone called Neuropeptide Y. Leptin regulates the body weight by serving as a rapid booster of metabolism. Although leptin reduces appetite as a circulating signal. Obese individuals who are predisposed with higher percentage of body fat have higher circulating concentration of leptin when compared with the normal individuals. Various studies proved that leptin levels is comparatively higher in obese than in the non-obese individuals. The mean leptin levels for the obese were found to be in the range of 26.2 – 77.4 ng/ml [4]. In obese individuals the excess circulating leptin, in their blood is not effectively recognised by the leptin

receptors, thus they continue to have hunger cravings. Reduction in food intake or losing body weight does not occur in such obese individuals as there is resistance to leptin similar to resistance of insulin in type 2 diabetes [5].

## MATERIALS AND METHODS

It is a hospital based correlative study carried out in Sree Balaji Medical College & Hospital, Chrompet, Chennai. The duration of the study was from August to September, 2018. The purpose of which was to analyse the effects of one month of yoga (suryanamaskar) practise on serum leptin levels in the obese.

Subjects: -30 obese student volunteers (17 boys and 13 girls) of the age group 17-19yrs without any known medical complications. Their body mass index was calculated using the Quetelet's index i.e. BMI = weight in kgs/ height in m<sup>2</sup> [1]. Non obese subjects BMI were defined as 18.5-24.9 kg/m<sup>2</sup> & obese  $\geq 30$  kg/m<sup>2</sup> [1]. Their weight was measured using the digital weight scale and height using the stadiometer. Participants were asked to perform 30 minutes of yoga (suryanamaskar)/day, 5 days a week for a period of 4 weeks (one month). Diurnal variations were seen in the serum leptin levels i.e. it's relatively higher between midnight and early morning to promote a satiety effect during the night. Thus to avoid diurnal variations the samples were all collected during the same time frame in the daytime from all the members of the study group.

### Exclusion criteria

Complications like DM, hypothyroidism, polycystic ovarian disease (PCOD) in females, and use of any antiobesity drugs

### Data collection

Their serum leptin levels were measured before (19.4 +/- 6.4 ng/ml) and after yoga training (i.e. after 4 weeks of yoga) by ELISA method- Sandwich Enzyme Linked Immunosorbent Assay technique in the Central Laboratory in S.B.M.C.H using the Human Leptin elisa test kit (ab 179884). As per the manufacturers specifications, protocols and recommendations the normal range of serum leptin levels in males was 0.3 to 13.4 ng/ml and in females it is 4.7 to 23.7 ng/ml [4]. Their BMI (Body mass index) was also recorded both before and after one month of suryanamaskar practise using the Quetelet's index.

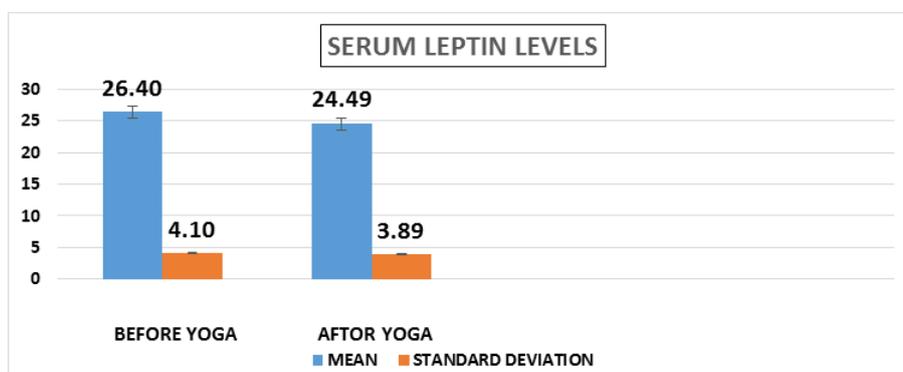
### Statistical analysis

Data entry was done in MS excel sheet. Software package for the social sciences version Spss 18 was used to perform statistical analysis.

## RESULTS

**Table-1: Explains changes in serum leptin levels before and after yoga**

Serum leptin levels	N	Mean	Standard deviation
Before yoga	30	26.40	4.10
After yoga	30	24.49	3.89



**Fig-1: Explains that the mean serum leptin levels in the 30 obese teenage volunteers reduced from 26.40 ng/ml to 24.49ng/ml and their standard deviation reduced from 4.1 to 3.89 following one month of regular yoga (suryanamaskar) practise**

Among the 30 obese volunteers, 19 subjects (i.e. 63%) showed decrease in serum leptin levels

ranging from (1.5 - 4ng/ml) with a significant p value of 0.01(significant as p value is < 0.05).



**Fig-2: Comparison of mean BMI values before and after yoga**

Among the 30 subjects, 13 subjects (i.e 43.33%) showed decrease in BMI, with a little balanced satiety levels after one month of regular yoga (suryanamaskar) practice.

bring awareness for early intervention in order to obtain favourable health outcomes.

## DISCUSSION

In this study we investigated the effects and the correlations of one month of regular suryanamaskar practice and the corresponding changes in their serum leptin levels in our obese teenage volunteer group. The study mainly addressed teenagers because children and teenagers with obesity are associated with increased risk of premature death and disability in adulthood, increased risk of future breathing difficulties, increased risk of fracture, hypertension, early marker of cardiovascular diseases, insulin resistance, metabolic syndrome, etc [6]. Thus childhood obesity and obesity amidst teenagers needs to be addressed earlier, and we should also emphasize its potential significance, to

Suryanamaskar is said to yield maximum benefits when done in early morning on an empty stomach, in accordance with its name “sun salutation” [7].The dynamic stretches in suryanamaskar in the forward and backward directions & the rhythmic positive and negative changes in the viscera is said to stimulate various visceroreceptors thus making all the systems to work at an optimal level. In addition most participants stated to have achieved a general sense of positivity, vitality with improved concentrating ability by doing yoga. In general it has already been proved globally that suryanamaskar helps to maintain cardiovascular health ,stimulates the nervous system, helps in stretching, flexing and toning the muscles ,excellent exercise for weight loss management, relaxes the mind and helps in enhancing the optimal

functioning of the bodies chief defence mechanism –the immune system[3]. So it has an overall totally positive influence on the body.

Our study showed that the regular practice of suryanamaskar though for a short period of one month, significantly reduced the relatively higher serum leptin levels and the BMI in the obese teenagers with no other known complications. Various prospective studies addressing increased risk for type 2 diabetes, hypertension, and cardiovascular disease have high lightened the importance of adipocytokines[8]. Although these healthrisks are clearly related to more extreme values then we found in our small obese teenage volunteer group, our data raises the possibility that regular practice of yoga does have beneficial health consequences by decreasing the serum leptin levels and by decreasing the BMI levels in the obese.

By decreasing the serum leptin levels, the leptin receptor sensitivity tends to improve thereby reverting and decreasing the receptor resistance found in the obese [9]. Thus the circulation leptin signals, to turn on the receptors. The brain in turn recognizes the leptin load and gives control to check the excess intake and to burn off the excessive calories in the obese.

## CONCLUSION

Our analysis showed that of the 30 obese teenage volunteers in our study group 19 subjects (i.e. 63%) showed significant decrease in their serum leptin levels with a significant p value of 0.01 & 13 subjects (i.e 43.33%) showed decrease in their BMI levels, with a little balanced satiety levels just after one month of regular yoga (suryanamaskar) practice.

The results of this study can be considered to be significant because it was a self reported yoga session with no monitoring and secondly there were no limitations/check/control over the obese subjects eating habits. Despite these two limitations there was significant decrease in serum leptin levels, and decrease in their BMI levels as well. There by proving that regular intensive yoga practice does have beneficial health consequences against obesity.

Thus for ”exploring the iceberg phenomenon of yoga” i.e, to explore the untapped true hidden health benefits of yoga additional detailed research and further long term duration studies involving larger,diverse study groups are needed.

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