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Original Article

Concordance and Disconcordance of Serum Levels of Leptin with Leucocyte Telomere Length Across Spectrum of Adult Body Mass Index Among Indian Rural Population

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ABSTRACT

Background: Throughout the world, obesity is growing as health problem for both adults and children.
Aim: to evaluate the relationship of leukocyte telomere length with leptin across the body mass index spectrum
Methods: Present cross-sectional observational study was conducted in patients attending a tertiary care hospital who met the inclusion criteria. The patient was evaluated and included in study after obtaining the informed consent. The blood samples collected were transported to laboratory for analysis of leptin and telomere length. Measurement of leukocyte telomere length using qPCR method.
Results: Total of 360 patients with mean age of the patients 47.84±15.84 years, equally distributed across age group. A significant inverse relation of body mass index with telomere length (r-0.21) and a significant association of waist to hip ratio with telomere length (r 0.24). No significant association between length of telomere with the serum level of Leptin.
Conclusion: Present study documented mean length of Telomere correlated negatively with BMI and age. In the current investigation, leptin had no significant connection with telomere length.

Keywords: *Leukocyte Telomere, Leptin, Indian Rural Population*

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INTRODUCTION

Throughout the world, obesity is growing as health problem for both adults and children. Many authors have documented association of telomere length with presence of obesity, but the relationship between shortening of telomere and obesity remains ambiguous due to inconsistent results.[1–3]

It has been proposed that leptin plays a role in the mechanisms that lead to telomere shortening in obesity. Obese people's increased telomere length was consistently linked to calorie restriction and weight loss, indicating a link between obesity and telomere length.[4–6]

Many studies have also discovered that leptin and telomere length are both independent and related to BMI. This suggests that there may be a direct connection between obesity and leptin. Our research goals also call for additional investigation into this connection with telomere length. The ends of chromosomes are protected from wear and tear by telomeres.[7–9] Because it indicates the number of times a cell has regenerated, the length of a cell's telomeres can be used as a measure of cellular senescence.[10] Telomere shortening is also increased by oxidative stress and inflammation. As a result, obesity-related inflammation and the function of leptin in this process ought to be studied. Present study aimed to evaluate the relationship of leukocyte telomere length with leptin across the body mass index spectrum.

METHODS

The present cross-sectional observational study was conducted in a tertiary care hospital for one year among people who met the inclusion criteria. Participants over the age of 18 who are not diabetic and willing to participate in the study were eligible. The research excluded patients having a history of edoema, renal illness, heart disease, liver disease, diabetes mellitus, cigarette smoking, pregnancy, or breastfeeding. After obtaining informed consent, a total of 360 individuals who met the inclusion criteria were included, and participants were recruited after being cleared by the ethics committee (ECR/834/1ST /TG/2016).

A comprehensive history was gathered from the patients after they provided written and informed permission. Following a physical examination, the patient's height and weight were assessed twice using established procedures. According to the NHLBI, BMI is calculated as kg/m2. Asian-Pacific guidelines was used to categories based on BMI of patients. The cutoff points are: obese (≥ 25 kg/m2), overweight (23 to 24.9 kg/m2), normal weight (18.5 to 22.9 kg/m2), and underweight (less than 18.5 kg/m2).

Patients' venous samples were then taken and promptly centrifuged. The serum taken from these samples was numbered and sent to the lab in an ice box for Leptin and Telomere length analysis. Telomere length was measured in leukocytes using the qPCR method. In the data collection proforma, data was collected using a prepared questionnaire.

Statistical analysis

The data were input into an excel spreadsheet and analysed with SPSS v26.0 on Windows 10. The data was summarised using the mean, standard deviation, frequency, and percentage. The t-test was used to analyse the mean difference between the continuous data, and Pearson's correlation was used to analyse the correlation between the parameters. Statistical significance was defined as a p-value of 0.05.

RESULTS

After obtaining informed consent from all patients, a total of 360 patients who met the inclusion criteria were included in the current study. The mean age was 47.84±15.84 years, and equal distribution between the age groups as shown in table 1.

Table 1. Distribution of patients age-wise

Groups	Frequency (%)
25 to 39 years	120 (33.333)
40 to 45 years	120 (33.333)
Equal or more than 55 years	120 (33.333)
Mean	47.84
Standard Deviation	15.84
Obesity	
Mean	28.20
SD	3.32

Table 2. Showing the correlation of Weight, BMI, WHR and neck circumference with Telomere length

Variables	Telomere Length Correlation with		
	Spearman R	t-value	p-value
BMI	-.21	-1.97	.05*
Weight (in kgs)	-.16	-1.51	.14
Waist to Hip ratio	.24	2.22	.02*
Neck circumference	-.23	-2.19	.03*
Leptin	.09	0.87	.39

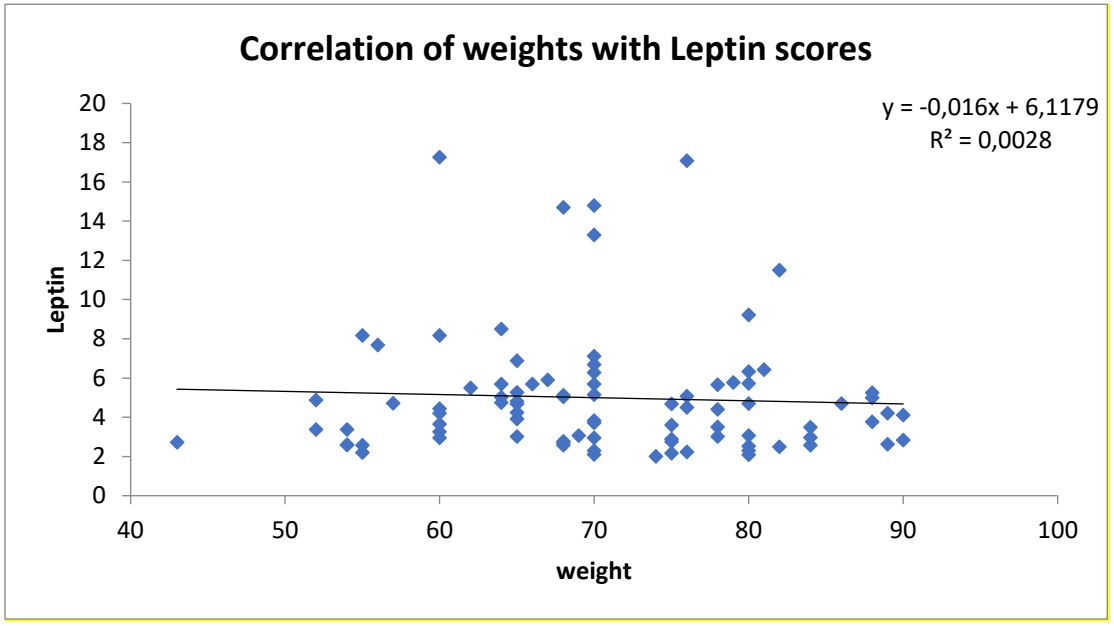

Figure 1. Correlation of weights with Leptin scores

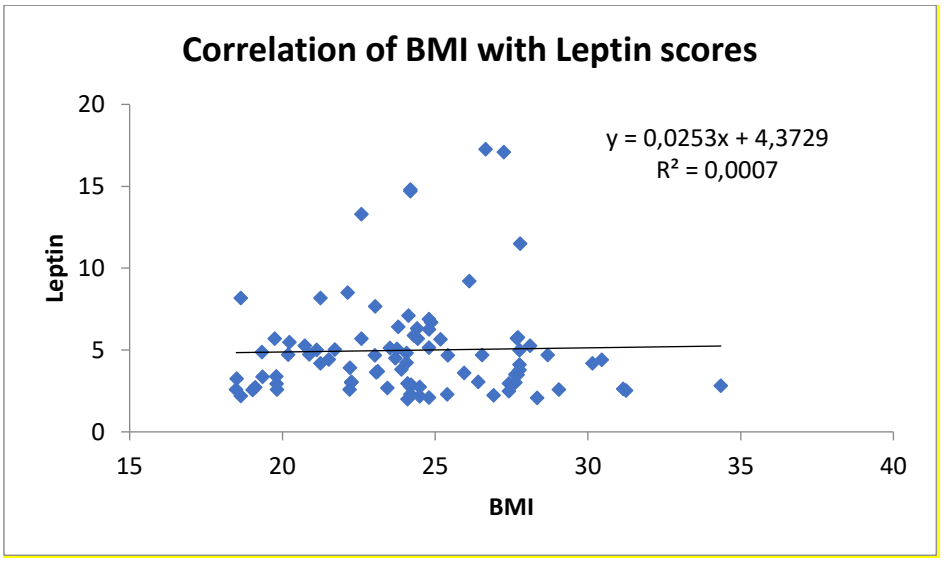

Figure 1. Correlation of BMI with Leptin scores

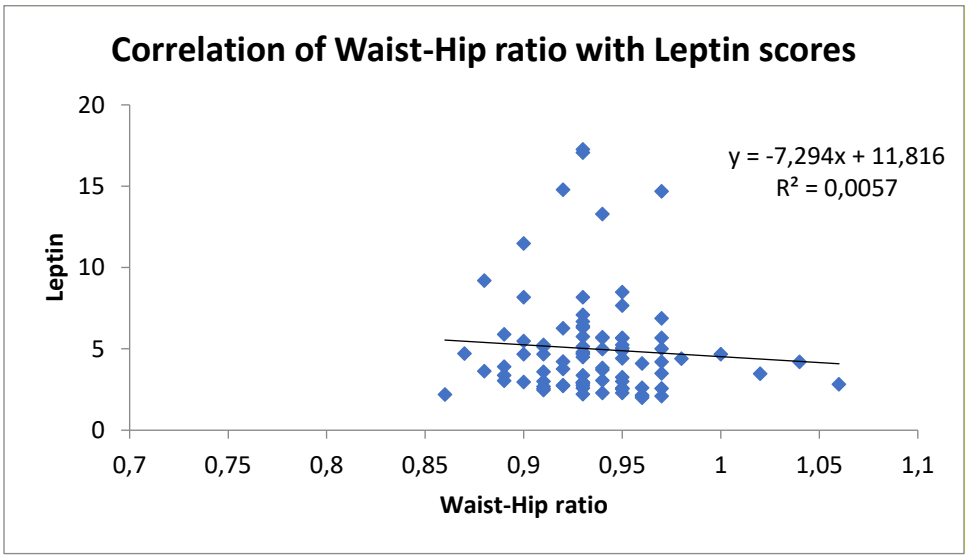

Figure 2. Correlation of Waist-Hip ratio with Leptin scores

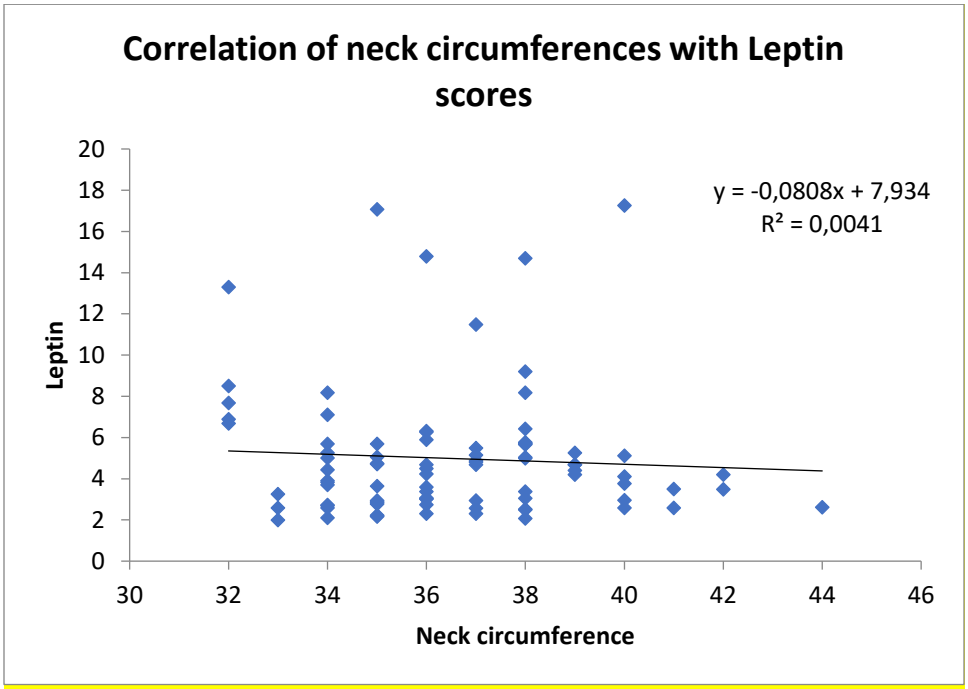

Figure 3. Correlation of neck circumferences with Leptin scores

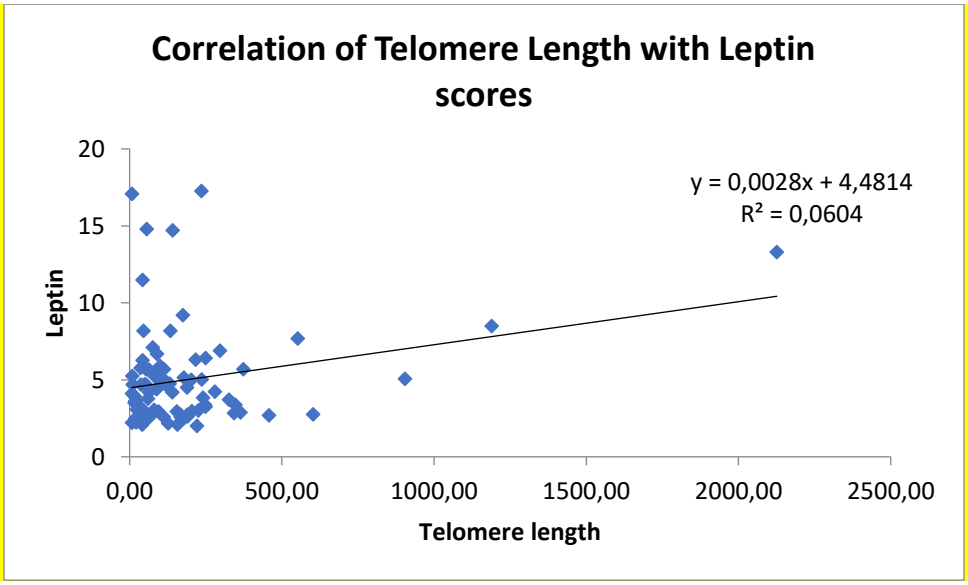

Figure 4. Correlation of Length of Telomere with Leptin scores

Table 1. Length of Telomere in different age and BMI groups.

Relation	Mean ± SD
25 to 39 years with normal	291.4 ± 330.1
25 to 39 years with OW	312.5 ± 261.2
25 to 39 years with obese	89.4 ± 76.54
40 to 54 years with normal	77.2 ± 56.03
40 to 54 years with OW	228.8 ± 164.04
40 to 54 years with obese	103.7 ± 82.6
>=55 years with normal	334.2 ± 635.8
>=55 years with OW	123.9 ± 82.6
>=55 years with obese	68.0 ± 104.4

DISCUSSIONS

Worldwide, obesity is a growing health issue and a leading preventable cause of death, affecting both adults and children. Obesity is a major contributor to a number of metabolic syndromes and accelerated aging. Leptin plays a crucial role in regulating body fat mass and possesses proinflammatory properties that encourage oxidative stress.[11,12] The length of a cell's telomeres tells how many times a cell has reproduced and can be used to predict when it will die. Additionally, telomere shortening is accelerated by oxidative stress and inflammation.[13–15]

In present study 360 patients with mean age of 47 were included and mean BMI of 28.20 ± 3.32. There is a negative correlation between telomere length was seen with body mass index ($r=-0.21$, $p<0.05$), waist to hip ratio ($r=0.24$, $p<0.05$) and neck circumference ($r=-0.23$, $p<0.05$).

In agreement, Piplani et al. found no statistically significant link between age and telomere length.[16] Another study discovered that telomere length is negatively linked to age and height.[17] In another study by Sai G et al., documented no significant correlation of leptin with telomere length and anthropometric data. However documented a significant inverse relation of BMI with length of telomere.[9]

Childhood obesity is associated with shorter leucocyte telomeres in males, but not in females. There are clinical concerns regarding the implications of these markers for premature aging in children because of their relationship with blood pressure, waist circumference, and leucocyte telomere length.[18] Attas OA et al. found that obese boys had significantly shorter mean telomere lengths than their lean counterparts ($p=0.049$), but not girls. It was not connected to adipocytokines, insulin resistance, or inflammatory markers. Systolic blood pressure was the primary predictor of telomere length in girls, accounting for 84% of the variance ($p=0.01$), while waist circumference accounted for 24% of the variation ($p=0.041$).[18] Blood leptin levels did not significantly correlate with physical characteristics in the study.

Serum leptin and telomere length have no significant relationship ($r=0.092$). In any case, Valdes AM et al. that blood levels of leptin, a marker and regulator of body fat that may have pro-inflammatory properties and promote oxidative stress, are negatively correlated with telomere length.[19] Linear regression continually analysed anthropometric parameters, visceral fat, adiponectin, leptin, or adiponectin

and leptin ratios for the total sample or stratified race or gender, and the telomere length assay ratio in a research by Diaz VA et al. demonstrated that there was no connection between The factors that affect telomere length in various populations require additional research.[20]

CONCLUSION

The present study documented a significant negative relation of length of telomere with age and BMI of patients. Further no significant correlation with serum leptin levels.

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Conflict of Interest

All authors declare no conflict of interest, and agree to publish the article in journal.

Ethical consideration

Ethics clearance was obtained prior to start of study and all participants provided the written consent.

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