



Research Article

CORRELATION OF LEPTIN LEVELS WITH HEART RATE VARIABILITY IN YOUNG ADOLESCENT FEMALES WITH NORMAL BODY MASS INDEX

Dr.P.R.Devaki¹, Dr.S.Mahila^{2*}, Dr.M.Kanimozhi³ and Dr.M.R.Renukadevi⁴

^{1,2,4}Department of Physiology Sree Balaji Medical College and Hospital, Bharath Institute of Higher education and Research
³Medical officer, Achirupakkam

ARTICLE INFO

Article History:

Received 14th November, 2019

Received in revised form 29th December, 2019

Accepted 05th January, 2019

Published online 28th February, 2020

Key words:

Heart rate variability , leptin , skin fold thickness .

ABSTRACT

Background: Heart rate variability (HRV) measure is emerging as the most important predictor of various cardiovascular disease. Heart rate variability has been related to almost all the factors which directly affects the HRV measures. However, at present with increasing incidence of cardiovascular disease in subjects with normal BMI, body mass index seems to have least role in determining the cardiovascular risk. It is a known fact that leptin receptors are found in the heart as well as in the blood vessels. **Objective:** The present study was done to measure the heart rate variability in young adolescent girls, correlate the HRV parameters with leptin levels. **Materials & Methods:** Forty (40) young adolescent females of age group 17 – 19 years with normal BMI and regular menstrual cycle were included in the study. Body Mass Index was calculated using height and weight. Resting Heart rate and Blood Pressure were measured. ECG was recorded in lead II using RMS Polyrite –D to determine the Heart rate variability measures LF, HF and LF/HF ratio. ECG recording was done on the second day of menstrual cycle. 5 ml of intravenous blood was collected to estimate the leptin levels in all the subjects. **Results:** A positive trend was observed between LF values and leptin levels ($r = 0.140$), Negative trend was observed between HF values and leptin levels ($r = -0.138$), BMI had a slight positive correlation with leptin levels ($r = 0.02$).

Copyright©2020 Dr.P.R.Devaki et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Obesity is considered as the leading cause for cardiovascular morbidity and mortality (1). However, recent studies have shown that there is no difference in the presence or severity of coronary heart disease and cardiovascular events among different BMI category (2). The incidence of cardiovascular disease was higher among the older age group people. But recent studies have shown that the prevalence of CAD in young is about 5-10% in Indians (3).

Female sex hormones was considered to be protective against cardiovascular diseases in females, but recently CVD is identified as the major cause of death in women and it is still under recognized and under treated (4). The prevalence of coronary heart disease in males and females is almost equal in younger age group between 20- 30 years (5). With these controversies, it is necessary to explore the role of other factors that may be the causative agent for coronary heart disease.

Leptin is a 16 kDa protein secreted by white adipose tissue involved in regulation of food intake and energy expenditure.

Studies have shown that leptin is involved in cardiovascular complications of obesity, including arterial hypertension (6). Receptors for leptin was found in the heart as well as in the blood vessels. Hence, it is necessary to explore the role of leptin in cardiovascular health.

Modulation and regulation of heart rate variability changes has been brought about by autonomic and neural mechanism. Heart rate variability measures the autonomic functions of the body. Measurement of HRV helps in assessing the resting autonomic tone. Correlation of leptin levels with heart rate variability may throw light on the role of leptin in cardiovascular health.

Aim & Objective

- To measure the Heart Rate Variability in young adolescent girls.
- To correlate the Heart rate variability LF, HF and LF/HF ratio with leptin levels and body fat mass.

MATERIALS AND METHODOLOGY

Inclusion criteria

40 Females subjects of age group- 17-19 years with Normal (BMI- 18.5-25) having regular menstrual cycle were included in the study.

*Corresponding author: Dr.S.Mahila

Department of Physiology Sree Balaji Medical College and Hospital, Bharath Institute of Higher education and Research

Exclusion criteria

Regularly exercising persons, those Taking drugs affecting ANS, Obese and morbidly obese Females with menstrual irregularities were excluded from the study.

Ethical committee clearance was obtained from our institution. Written informed consent obtained from the subject. The subjects was asked fill the proforma. Height and weight was measured to Calculate the BMI. Heate rate and Blood Pressure were measured .5 ml of blood sample collected after 12 hours of fasting. Subjects were asked to To abstain from caffeinated products for 12 hrs .Recording of ECG was done either in fasting or 2hrs after a light breakfast . Subjects were Asked to empty the bladder before recording .ECG recording was done on the third day of their menstrual cycle , between 8- 11 AM in supine position in lead 2 by using DAQ acquisition AD instruments to obtain HRV values.

RESULTS

Table 1 Baseline characteristics

Age (yrs)	18 ± 1 years
BMI Kg/m ²	21.9 ± 3.82 kg/m ²
Resting HR	72 ± 6 BPM
Resting SBP	118 ± 4 mmHg
Resting DBP	78 ± 2 mmHg

Table 2 Correlation of Heart rate variability parameters with Leptin Levels

HRV parameters	LEPTIN
LF nu	P= .208, r= .192
HF nu	P= .208, r= .193
LF/HF ratio	P=.232 ,r=.144

DISCUSSION

Levels of leptin positively correlated with LF values in our study indicating increased sympathetic activity .However, results were not statistically significant.

Leptin means thin, it is secreted by the adipose tissue .It is known as anti – obesity hormones. Plasma leptin levels in healthy children and adolescent, depends on BMI, body fat mass%, gender, puberty& testosterone. Studies have shown that leptin levels were lower in males when compared to females due to the suppressive effect of androgens. Serum leptin levels positively correlated with bioavailability of estrogen.

Higher sympathetic activity is related to higher leptinlevels (7).Estrogen is considered to have aCardioprotective effect. The positive correlation of estrogen puts this effect of estrogen in question .The positive correlation of leptin with LF values observed in our subject indicates sympathetic activity . Receptors for leptin has been found in the heart and blood vessels and hence this effect could be due to action of leptin on these receptors

The statistical insignificance which we have observed may be due to the sample size . Further , this study was done with normal BMI and leptin levels hence probably much changes was not observed .Correlation of sex hormones with leptin levels in both the genders could be done to explore the effect of these hormones in leptin levels

References

1. Relationship between obesity and cardiovascular diseases in four states and Colorado ; Lumakil,H.Anwar Ahmad, *Journal of health care for the poor and underserved*, 2011;22 (4) suppl:61-72.
2. Relationship of physical fitness to BMI with coronary artery disease and cardiovascular events in women: Timothy.R.Wessel, Christopher .B.Arant ,*JAMA* 2004;292(10);1179-1187.
3. Newer perspectives of Coronary Artery Disease in young: Amiteshagarwal, Saurabhsrivastava, *World Journal cardiology* 2016, Dec 26:8 (12)728-734.
4. Gender differences in coronary heart diseases, AHEM MASS and YEA Appelman: *Neth Heart J* 2010, Dec:18(12)598 – 602.
5. National Health and nutrition examination survey 2009-2012, Mozaffarian D, *et al*, *Circulation* 2015 ; 131:e 29-e322.
6. Role of leptin in blood pressure regulation and arterial hypertension. Beltowski J, *Journal Hypertension* ,2006 May 24 (5),789-801.
7. Leptin, the sympathetic nervous system and Blood pressure: The tale is still without an end , Grassi, Guido, *Journal of Hypertension* : April 2014,volume 32(4),738-739.

How to cite this article:

Dr.P.R.Devaki, Dr.S.Mahila, Dr.M.Kanimozhi and Dr.M.R.Renukadevi (2020) 'Correlation of Leptin Levels with Heart Rate Variability in Young Adolescent Females with Normal Body Mass Index', *International Journal of Current Advanced Research*, 09(02), pp. 21141-21142. DOI: <http://dx.doi.org/10.24327/ijcar.2020.21142.4147>
