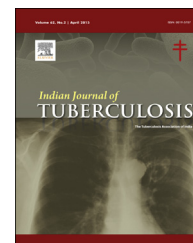


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## Original Article

# Leptin level correlates with obesity and health related quality of life in obstructive sleep apnea syndrome patients

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## ABSTRACT

**Background:** Leptin takes part in regulation of energy balance, neuronal functions, pain and mood. It may act as intermediary marker for various components of HRQoL in patients of obstructive sleep apnea syndrome.

**Aims:** To document the correlation among leptin levels, obesity and HRQoL in OSAS patients.

**Methods:** A tertiary care hospital based cross-sectional study was done in 224 subjects aged 18–65 years, after taking informed consent. Subjects with previous history of smoking, Liver disease, COPD, CHD, T2 DM, asthma, cancer, end stage renal disease, heart failure, any endocrine disorder including Cushing syndrome, thyroid, on systemic steroid or any continuous medication for last 6 months, on dieting or suffering from any disability condition (other than obesity and OSAS) affecting their HRQoL were excluded from the study. All subjects underwent Polysomnography. Leptin assay was done by ELISA method. Hindi version of HRQoL tool SF-36 was used to evaluate HRQoL.

**Results:** SPSS 20 was used to analyse data. Three groups (AHI <5, 5 to 15 and >15) were compared. Significant differences were observed in BMI, NC, WC, WHR and ESS. Differences were not significant in sleep architecture and Leptin level. SF-36 HRQoL, scores were observed decreased with increase in severity of disease. Leptin level was found significantly correlated with “Role limitations due to physical health problems”, “Social functioning”, Hypopnea and obesity indices.

**Conclusions:** In these subjects Obesity indices are the most important correlates of Leptin level. Oxygen desaturation indices with exception of Hypopnea and HRQoL may not be exclusively correlated to leptin levels.

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## 1. Introduction

Obstructive Sleep Apnea Syndrome (OSAS) is characterized by difficulties in breathing during sleep and associated physiological and metabolic abnormalities resulting from disturbed sleep. This condition afflicts 4% of men and 2% of women.<sup>1</sup> Patients experience loud, heavy, and repetitive snoring and chronic fatigue. Disrupted sleep, nocturnal arousals and Excessive Daytime Sleepiness (EDS) are some other important symptoms. It poses detrimental effects on physical and mental functioning. The effects of sleep disorders on the quality of life (QOL) have been documented in the literature.<sup>2–4</sup>

Leptin is a cytokine-like hormone. It is produced in adipose tissue and takes part in regulation of energy balance and in a range of other processes via actions in the central nervous system.<sup>5</sup> Leptin activates its cognate receptor primarily on the central nervous system by binding them.<sup>6</sup> Circulating leptin levels reflect the quantity of energy stored in adipose tissue and are correlated to the body mass index (BMI) in humans.<sup>7</sup> Leptin has a variety of other key central and peripheral functions to regulate metabolism, fertility and bone metabolism.<sup>8</sup> Leptin has peripheral actions to stimulate oxidative stress, vascular inflammation and vascular smooth muscle hypertrophy that may contribute to pathogenesis of type 2 diabetes mellitus (T2DM), High Blood Pressure, atherosclerosis and coronary heart disease (CHD).<sup>9–11</sup> Obesity is recognized to be an important risk factor for occurrence and worsening of OSAS. Obesity itself has a major role concerning deterioration in quality of life. Approximately 70% of cases with this disease are obese.<sup>12</sup>

Leptin also has a broad role in the regulation of neuronal functions, nociceptive behavior and neuropathic pain.<sup>13</sup> Neuronal leptin receptors are expressed across functionally well equipped areas of brain which includes the hypothalamus, thalamus, cortex, hippocampus, amygdala and in the dorsal root ganglion which are implicated in the control of mood and emotion. This expression pattern is consistent with leptin's feeding behavior, tissue inflammation and other extensive neuronal functions. Leptin may also mediate depressive symptoms.<sup>14,15</sup> Thus Leptin may perform as intermediary marker for various components of HRQOL in patients of obstructive sleep apnea syndrome.

The purpose of the present study was to document the correlation among leptin levels, obesity and HRQOL in OSAS patients.

## 2. Material and methods

Two hundred twenty four male subjects aged between 18 and 65 years were enrolled in the study after taking written/informed consent. This tertiary care hospital based cross-sectional study was conducted between November 2010 and May 2014 after obtaining ethical clearance from university research ethics committee. Subjects with previous history of smoking, Liver disease, COPD, CHD, T2 DM, asthma, cancer,

end stage renal disease, heart failure, any endocrine disorder including Cushing syndrome, thyroid abnormalities, on systemic steroid or any continuous medication in last 6 months, on dieting or suffering from any disability condition (other than obesity and OSAS) affecting their quality of life were excluded from the study.

### 2.1. Polysomnography

Full night Polysomnography was carried out with S-7000, Cogent technologies, EMBLA System Inc, which includes Electroencephalograms (EEG), (C3-A2,C4-A1,O2-A1,O3-A2), Bilateral Electro-oculogram (ROC,LOC), Chin and Leg Electromyogram, Nasal airflow, Thoracic and abdominal movements, ECG, Oxygen Saturation measurement by finger Pulse oximeter and body position recorders. Apnea Hypopnea Index was calculated with the help of Somnologica Studio software. The apnea episodes were defined as complete cessation of airflow for  $\geq 10$  s, and hypopnea was defined as a  $\geq 50\%$  reduction in oronasal airflow accompanied by a reduction of at least 4% oxygen saturation calculated by pulse oximetry. Apnea events were classified as obstructive, mixed, or central, according to the presence or absence of breathing efforts with thoraco-abdominal paradox. AHI was determined by the frequency of these events per hour during sleep time based on the results of the overnight polysomnography. Recorded Polysomnographic data was cross checked manually for scoring of sleep stages, apneas and Hypopnea events regarding each subject.

### 2.2. Leptin assay

Fasting venous blood samples were taken in a serum separator tube after completion of the overnight polysomnography study (within 30 minutes and between 07:00 to 08:00 AM) from all subjects. After clot formation, samples were centrifuged at  $2000 \times g$  for 10 minutes. Serum was removed and stored in deep freezer at  $-20^\circ\text{C}$ . Leptin assay was done by ELISA method (as per manufacturer's instructions of AviBion reagents kit).

### 2.3. Evaluation of HRQOL (SF-36)

The "SF-36" is a 36-item generic Health Related Quality of Life measure that assesses eight domains: 1) physical functioning (PF); 2) role limitations due to physical health problems (RP); 3) body pain (BP); 4) general health perception (GH); 5) vitality (VT); 6) social functioning (SF); 7) role limitations due to emotional health problems (RE), and 8) mental health (MH).<sup>16</sup> The SF-36 Health Survey was translated and validated in Hindi for the Indian population. Subjects came to sleep lab for polysomnography at 9:00 pm and were asked to complete the self-administered QOL SF-36 Health Survey an hour prior to overnight polysomnography. All scores ranged from 0 to 100, with a higher score indicating better QOL. Domains were analyzed separately. Hindi version of HRQOL tool SF-36 was used to evaluate PF, RP, BP, GH, VT, SF, RE, MH, Physical

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