Volume 3 (2), 2015, Page-667-670
CODEN (USA)-IJPRUR, e-ISSN: 2348-6465

PHS Scientific House
PHARMAHEALTHSCIENCES

International Journal of Pharma Research and Health Sciences

Available online at www.pharmahealthsciences.net

Case Study

Analysis of Polysomnography in 21 patients with Obstructive Sleep Apnea in Tertiary Care Hospital – a Case Series

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ARTICLE INFO

Received: 03 Mar 2015
Accepted: 20 Apr 2015

ABSTRACT

Background: Obstructive sleep Apnea (OSA) is one of the important sleep related breathing disorders. It is associated with increased morbidity and mortality from cardiovascular causes, and traumatic accidents due to Excessive daytime sleepiness (EDS). In the case of sleep apnea it's not possible to define exactly what cases will develop significant cardiovascular disease, or what will be victims of increased accidents. But in general, untreated OSA is considered to be a risk factor for the development of conditions such as hypertension, cardiac failure, arrhythmia, pulmonary hypertension and insulin resistance. **Objectives**: The objective of present study was to describe overnight polysomnographic measures in 21 consecutive patients (19 male and 20 female patients) of 20 to 70 years old, who presented to OSA clinicfrom January 2010 to July 2011in St. John's Medical College Hospital Bangalore. Data was analysed using non parametric tests in SPSS 17.0. P<0.05 was considered as statistically significant. **Results**: The result of the Polysomnography (PSG) revealed no significant correlation between RDI (respiratory disturbance index) vs.BMI (Body Mass Index), Mallampati, and Mueller'smaneuver. However there was significant correlation between Arousal Index and Mueller's manoeuver and also between Body Mass Index and Mueller's manoeuver – palate.

Key words: Polysomnography, Muellers manoeuver, Obstructive sleep Apne Mallampati

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1. INTRODUCTION

The smoke Obstructive sleep Apnea (OSA) is one of the important sleep related breathing disorders that

affects approximately 9% of women and 24% of men in the general population[1]. Symptoms of OSA are due to repetitive upper airway obstruction leading to sleep fragmentation, cardiovascular stimulation and oxygen desaturation during sleep. Clinically OSA is defined by unrefreshing sleep, excessive day time sleepiness, snoring& breathing pauses observed by the patient's bed partner. [2] Patients usually present with excessive daytime sleepiness and tiredness, lack of concentration, memory impairment and frequently psychological disturbances. [3] The American Academy of Sleep Medicine has classified OSAS severity of OSAS (Obstructive Sleep Apnea Syndrome) based on Apnea-Hypopnea Index (AHI) and degree of daytime sleepiness. An AHI between five and 15 is considered as mild OSA, between 15 and 30 as moderate and higher than 30 as severe OSA[4]. It is estimated that OSA with daytime impairment occurs in one of 20 adults. OSA that is minimally symptomatic or asymptomatic is estimated to occur in one of five adults. [5]

Polysomnography (PSG) refers to the simultaneous recording of multiple neurophysiologic signals that are of interest to a clinician. Hans Berger in the late 1920s described the human electroencephalogram (EEG) for the first time. Since then rapid advancement of technology resulted in advanced monitoring instruments and today sleep centers around the world are capable of recording electro-oculogram (EOG), electromyogram (EMG), electrocardiogram (ECG), respiratory effort, nasal/oral airflow, SPO2 levels, snoring, and body position with video monitoring etc during Polysomnography(PSG). According to the American Academy of Sleep Medicine (AASM), there are four subtypes of sleep-monitoring procedures. Type 1 is the gold standard attended in-laboratory PSG, Type II isunattended(comprehensive) PSG, Type III is modified portable sleep apnea testing or cardiorespiratorysleep study and Type IV is continuous single recording, such as ambulatory overnight pulse oximetry, or dual bioparameter recording[6].

The objective of present study was to describe overnight polysomnographic measures in 21 consecutive patients who presented to OSA clinic in St. John's Medical College Hospital Bangalore.

2. MATERIALS AND METHODS

Twenty one consecutive patients who presented to OSA clinic at St. John's Medical College and Hospital from January 2010 to July 2011 were included in the study. Detailed history was taken from the patients and then patients were subjected to clinical examination. Body mass index (BMI) was calculated from body weight in kilograms (kg) and height in meters (m). Epworth Sleepiness Scale (ESS) was used to evaluate daytime sleepiness. Nasal endoscopy,Fiberoptic laryngoscopy with Muellers manoeuver were performed. Oropharyngeal airway was evaluated as per Malampatti grading and patients underwent overnight polysomnography (PSG) after obtaining informed consent from patients.Out of 21 consecutive patients, 12 patients were enrolled in 2010 and 9 were in 2011.

Thirty two channel polysomnograph was used for the study.Nasal and oral thermistors were used to measure air flow. SpO2 was assessed by pulse oximetryby using a disposable finger probe placed on the index finger. Snoring was recorded using microphones. Heartrate was measured by electrocardiography. Respiratory effort was monitored with a combination of intercostal electrodes and abdominal strain gauge. Audio visual information was obtained using a night vision camera. All of the studies were initially scored by a certified technician, and were subsequently reviewed by physicians experienced in PSG interpretation.The parameters analysed in the present study include: Total sleep time, Percent Stage 1, 2, 3/ 4, percent REM, Sleep efficiency and latency, Arousal index, REM

latency, Respiratory disturbance index, Periodic Limb movement index, Percent test time Saturation <90 %, Lowest Oxygen saturation and Mean EKG. Data was analysed using non parametric tests in SPSS 17.0, Spearman's rank correlation was performed. P<0.05 was considered as statistically significant.

3. RESULTS

Table 1 shows the descriptive measurements. Age distribution is presented in table 2.The average age of the patients was 43.19(SD=11.86).There were 19 male and 20 female patients. Majority of them had severe obstructive sleep apnea based on AHI (Figure 1).The result of the PSG revealed no significant correlation between RDI (respiratory disturbance index)vs.BMI (body mass index), Malampatti, and Muellersmanoeuver. However there was significant correlation between Arousal Index and Muellers manoeuver and also between Body Mass Index and Muellers manoeuver – palate. No significant correlation was found between clinical parameters and Polysomnography parameters.

4. DISCUSSION

OSA is a particularly common and under recognized medical disorder. It is associated with increased morbidity andmortality from cardiovascular causes, and traumatic accidents due to Excessive daytime sleepiness(EDS)[7].The present study demonstrated that Arousal Index has statistically significant correlation with clinical parameters than Respiratory Disturbance Index. There was no significant correlation between clinical parameters and Polysomnography parameters. Primary goal of screening is the identification of the risk factor or disease at an early stage, so that it can be corrected or cured. Screening techniques must be cost-effective, if they are to be applied to large populations[5]. PSG is considered as gold standard in diagnosis of sleep disordered breathing. This is mainly because sensitivity &specificity of clinical examination to diagnose OSA in clinical setting is poor. PSG helps to differentiate between obstructive, central,mixed apneas, hypopnea, and Respiratory effort related arousals. PSG is useful in assessing EEG, ECG abnormalities. PSG also assess severity of OSA.

Table 1: Descriptive Measurements

Parameters	Mean± Standard Deviation(SD)
Age	43.19±11.86
BMI	28.68±5.16
%Sleep stage 1	13.72±7.2184
%Sleep stage 2	64.25±12.065
%Sleep stage 3/4	3.810±5.0075
%REM	16.476±5.7407
RDI	68.40±39.667
PLMI	8.765±8.8080
<90% saturation	13.67±22.3031
Lowest O2 saturation	72.86±21.2977
Malampatti Grade	28.68±5.158

Table 2: Age Distribution

Age group (years)	No of patients
20-30	3
30-40	6
40-50	5
50-60	6
60-70	1

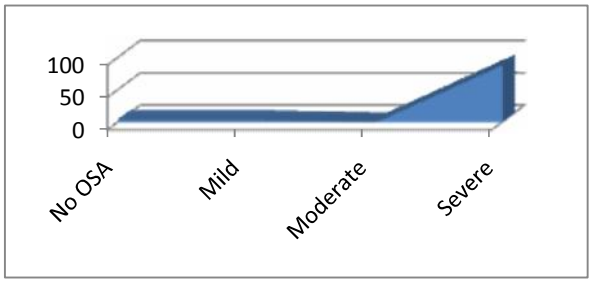

Fig 1: Severity of OSA

In the case of sleep apnea, with high prevalence in general population, it's not possible to define exactly which cases will develop significant cardiovascular disease, or which will be victims of increased accidents[5].But in general, untreated OSA is considered to be a risk factor for the development of conditions such as hypertension, cardiac failure, arrhythmia,

pulmonary hypertension and insulin resistance. Daytime somnolence that occurs with OSA results in poor daytime performance and can be a reason for accidents. So it is advisable to evaluate patients sleep disturbance including non-obstructive causes, for a sleep disorder[8]. For patients with sleep disorders,PSG readings will provide information necessary to frame aprecise diagnostic picture. When the proper cause of the patient'ssymptoms is identified, then patients can be appropriately treated.

5. CONCLUSION

An understanding of the physiology behind the EEG is crucial and the involvement of a skilled neurologist in interpretingboth wake and sleep EEGs is often valuable. For the interpretation of the PSG, data of EEG should be completely reviewed. The PSG is the culmination of a multi-faceted complex process. Comprehensive and detailed approach to the PSG will helps in efficient, individualized, optimal, and cost-effective medical management for the patient.

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Conflict of Interest: None