

## ORIGINAL ARTICLE

# Assessment of orthodontic treatment in management of Obstructive sleep apnea patients

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### ABSTRACT:

**Background:** Obstructive sleep apnea (OSA) is a sleep-associated disorder of breathing with a reduction or complete airflow obstruction despite an ongoing effort by patient for breathing. The present study was conducted to assess orthodontic treatment in management of OSA patients. **Materials & methods:** 70 patients of OSA of both genders were included. The upper airway was measured. All patients were given mandibular advancement appliance. All patients were recalled regularly and pre- treatment and post treatment airway was compared. **Results:** Out of 70 patients, males were 40 and females were 30. The mean pre- treatment nasopharyngeal airway space was 29.4 mm and post treatment space was 26.4 mm, oropharyngeal space was 11.2 mm and post pharyngeal space was 9.0 mm, hypopharyngeal space was 10.2 mm and post pharyngeal space was 18.4 mm. The difference was significant ( $P < 0.05$ ). **Conclusion:** Mandibular advancement appliance found to be effective in management of patients with obstructive sleep apnea.

**Key words:** Mandibular advancement appliance, obstructive sleep apnea, pharyngeal space

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### INTRODUCTION

Obstructive sleep apnea (OSA) is a sleep-associated disorder of breathing with a reduction or complete airflow obstruction despite an ongoing effort by patient for breathing. It usually occurs during sleep and muscles undergo relaxation and causes collapse of the soft tissues present in the back of the throat which leads to upper airway blockage.<sup>1</sup> Consequently, there are partial and complete pauses in breathing that last at least 10 seconds during sleep. Then, blood oxygen saturation, with oxygen levels decreases abruptly and falls 50% or more in severe cases. The brain shows response when there is less oxygen and alerts the body which causes a brief arousal from sleep.<sup>2</sup> This restores normal pattern of breathing. This pattern can occur hundred times in one night. This results a fragmentation in sleep quality and produces an excessive sleepiness during daytime.<sup>3</sup> Snoring is considered abnormal in children and adolescents. More importantly, it may serve as an indicator of a more severe respiratory problem that presents as a continuum, from primary snoring to obstructive sleep apnoea (OSA).<sup>4</sup> Reports vary on the prevalence of OSA, ranging from 0.7% to 5% of the population under 18 years old.<sup>5</sup> Breathing-induced sleep disorders have been proven to have a profound effect on the child's behaviour, growth and development; the myriad of symptoms include:

morning tension-type headaches, excessive morning thirst, excessive fatigue and sleepiness, abnormal shyness, withdrawn and depressive presentation, pattern of attention-deficit/hyperactivity disorder, memory impairments, aggressiveness and irritability, among many others. The severity of OSAS is differentiated based on Apnea Hypopnea Index (AHI) as mild when characterised by 5-15 events per hour, moderate in the presence of up to 30 events per hour, and severe when more than 30 events per hour.<sup>6</sup> The present study was conducted to assess orthodontic treatment in management of OSA patients.

### MATERIALS & METHODS

The present study comprised of 70 patients of OSA of both genders. All were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough oral examination was performed. Patients was prescribed with continuous positive airway pressure (CPAP). The upper airway was measured. All patients were given mandibular advancement appliance. All patients were recalled regularly and pre- treatment and post treatment airway was compared. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant ( $P < 0.05$ ).

**RESULTS**

**Table I: Distribution of patients**

Total- 70		
Gender	Males	Females
Number	40	30

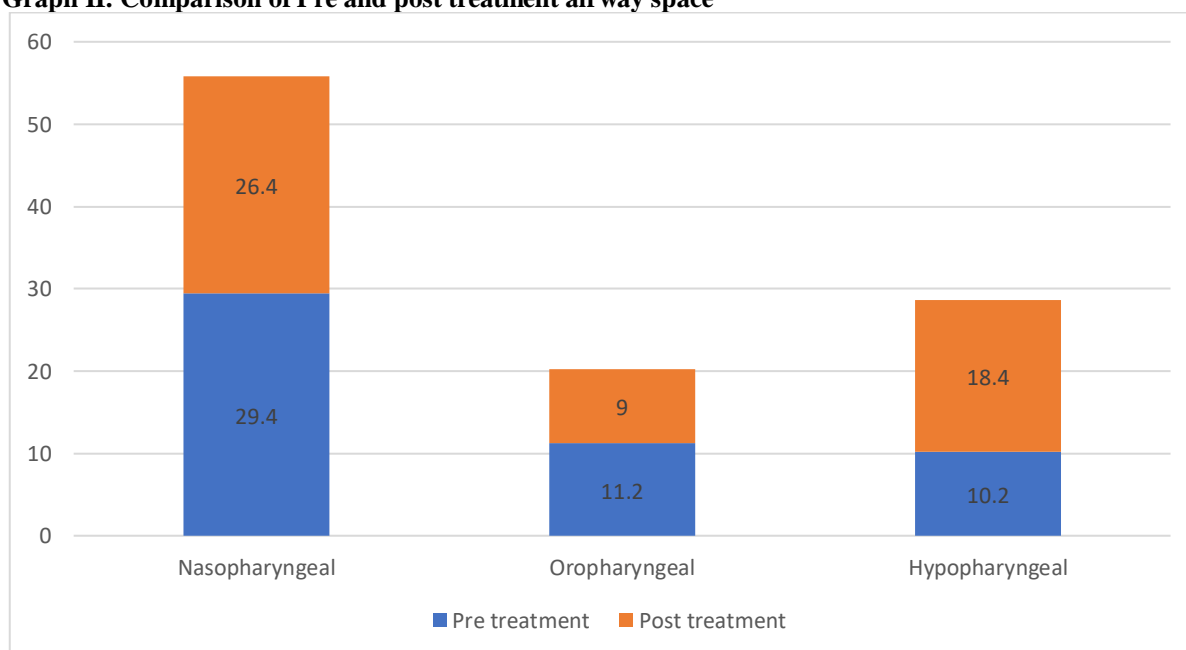
Table I shows that out of 70 patients, males were 40 and females were 30.

**Table II: Comparison of pre and post treatment airway space**

Airway (mm)	Pre- treatment	Post- treatment	P value
Nasopharyngeal	29.4	26.4	0.05
Oropharyngeal	11.2	9.0	0.03
Hypopharyngeal	10.2	18.4	0.01

Table II, graph II shows that mean pre- treatment nasopharyngeal airway space was 29.4 mm and post treatment space was 26.4 mm, oropharyngeal space was 11.2 mm and post pharyngeal space was 9.0 mm, hypopharyngeal space was 10.2 mm and post pharyngeal space was 18.4 mm. The difference was significant (P< 0.05).

**Graph II: Comparison of Pre and post treatment airway space**



**DISCUSSION**

The gold standard for diagnosing sleep apnea is through polysomnography (PSG).<sup>7</sup> A polysomnography (PSG) is an overnight sleep study attended by a sleep technologist during which measures at least seven different physiological signals.<sup>8</sup> According to the American Academy of Sleep Medicine, a diagnosis of OSAS can be made in the presence of five or more episodes of apnea/hypopnea per hour of sleep, accompanied by clinical symptoms (such as daytime sleepiness, mood disorder, insomnia, and hypertension) or at least 15 events per hour without additional symptoms.<sup>9,10</sup> The present study was conducted to assess orthodontic treatment in management of OSA patients.

We found that out of 70 patients, males were 40 and females were 30. Marshall et al<sup>11</sup> assessed the prevalence of treatment and diagnosis of snoring and sleep apnea. The overall response rate was 35.6% (18-24 n = 1421 and 25-64 n = 1879). One hundred and fifty-nine respondents reported seeking medical help

for snoring or sleep apnea with 133 of these being aged 25 to 64. Fifty-one respondents reported subsequent treatment (2.0%; 95% CI 1.49-2.43), with some reporting more than 1 treatment. Continuous positive airway pressure was received in 17 cases, mandibular advancement splints in 9 cases, and upper airway or nasal surgery in 31 cases. Eighty-six reported receiving an overnight sleep study (polysomnography). Most surgical patients did not report having their sleep measured with a sleep study (22/31).

We found that mean pre- treatment nasopharyngeal airway space was 29.4 mm and post treatment space was 26.4 mm, oropharyngeal space was 11.2 mm and post pharyngeal space was 9.0 mm, hypopharyngeal space was 10.2 mm and post pharyngeal space was 18.4 mm. El-Solh et al<sup>12</sup> in their study ten patients with residual apnea/hypopnea events on MAD who were intolerant to CPAP were included. After a washout period of 1 week off MAD, subjects were asked to use an auto-CPAP unit along with their

prescribed MAD for three consecutive nights. Oxygen desaturations were obtained from overnight oximetry. Efficacy of the combination therapy was evaluated by the Epworth Sleepiness Scale and Smartcard data recordings. The combination of MAD and nasal CPAP was well tolerated by all participants. Compared to CPAP alone, the optimal CPAP pressure required to eliminate all obstructive events on the combination therapy was reduced from  $9.4 \pm 2.3$  to  $7.3 \pm 1.4$  cm H<sub>2</sub>O ( $p = 0.001$ ). The residual apnea hypopnea index on the MAD decreased from  $11.2 \pm 3.9$  to  $3.4 \pm 1.5$  on the combination therapy ( $p < 0.001$ ). The number of oxygen desaturations was also less with the combination therapy than with MAD ( $p < 0.001$ ). Both the MAD and the combination therapy were effective in reducing daytime sleepiness from  $12.7 \pm 2.1$  at baseline to  $9.7 \pm 3.1$  ( $p = 0.04$ ) and  $7.5 \pm 4.1$  ( $p = 0.007$ ), respectively.

Furhman et al<sup>13</sup> determined the prevalence of symptoms evocative of obstructive sleep apnea (SE-O SA) and the magnitude of obstructive sleep apnea (OSA) underdiagnosis. The prevalence of SE-O SA was 4.9% (95% CI: 4.5-5.3), and that of self-reported OSA diagnosis was 2.4% (2.1-2.7). The prevalence of SE-O SA was 8% among people with hypertension and 11% among obese people. A previous sleep monitoring session was reported by 2.7% (2.4-3.0) of the participants and by 15.1% of people with SE-O SA. This latter proportion increased with age (24% in people with SE-O SA aged 60 years or over) and was higher in obese people (26%) and in those with chronic diseases (27% among people with hypertension).

## CONCLUSION

Mandibular advancement appliance found to be effective in management of patients with obstructive sleep apnea.

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