

Original Research

Efficacy of a Karwetzky activator in Obstructive Sleep Apnea in children

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ABSTRACT:

Background: Obstructive Sleep Apnea in children (OSA) is a sleep-disordered breathing (SDR) characterized by partial or complete obstruction of the upper airways (UA) during sleep and interfere with sleep patterns and growth and development in children. The present study was conducted to assess the role of efficacy of a Karwetzky activator in pediatric patients with OSA.

Materials & Methods: The present study was conducted on 54 patients OSA patients of both genders. The Karwetzky activator was given in patients with obstructive sleep apnea (OSA). They were initially treated successfully with this appliance. Further polysomnographic registrations at 6 to 12 weeks (T1) after the start of treatment, 6 to 12 months (T2) and 18 to 24 months (T3) later were performed for each patient wearing the appliance. **Results:** Out of 54 patients, boys were 24 and girls were 30. The mean Apnea-hypopnea index at T0 was 17.4 events/hour, at T1 was 4.2 events/hour, at T2 was 8.1 events/hour and at T3 was 8.3 events/hour. Apnea index was 8.4, 1.4, 3.2 and 4.6 events/hour at T0, T1, T2 and T3 respectively. Mean oxygen saturation was 94.2, 93.1, 93.5 and 94.1% at T0, T1, T2 and T3 respectively. Minimal oxygen saturation (%) was 79.2, 83.4, 79.5 and 80.6 at T0, T1, T2 and T3 respectively. Oxygen desaturation index was 13.2, 5.4, 9.4 and 9.2 at T0, T1, T2 and T3 respectively. Rapid eye movement sleep (%) was 13.7, 14.2, 14.8 and 15.2 at T0, T1, T2 and T3 respectively. Sleep in supine position (%) was 42.3, 47.5, 39.4 and 45.2 at T0, T1, T2 and T3 respectively. The difference was significant (P< 0.05). **Conclusion:** Authors found that Karwetzky activator is useful in management of mild-to-moderate OSA.

Key words: Karwetzky activator, Obstructive Sleep Apnea, Sleep

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INTRODUCTION

Obstructive Sleep Apnea in children (OSA) is a Sleep-Disordered Breathing (SDR) characterized by partial or complete obstruction of the Upper Airways (UA) during sleep and interfere with sleep patterns and growth and development in children.¹ The gold standard treatment in children is the removal of lymphoid tissue surgery. Disease recurrence can happen and is believed to be due to craniofacial concomitant problems, among others.² According to the international classification of sleep disorders, pediatric obstructive sleep apnea was

defined as an apnea-hypopnea index (AHI) \geq 1.0 or a pattern of obstructive hypoventilation defined as at least 25% of total sleep time with hypercapnia ($\text{PaCO}_2 > 50$ mm Hg) in association with snoring, flattening of the nasal pressure waveform, or paradoxical respiratory efforts.³ The Polysomnography Exam (PSG) is considered the gold standard for diagnosis, expressed by the apnea and hypopnea index (AIH), classified according to the number of occurrences per hour of sleep: the diagnosis is confirmed when the AHI is higher.⁴ The criteria diagnostic for children are different

from adults and have not been completely established yet. The short-term therapeutic efficacy of OAs has been proven clinically and by PSG in several studies. However, only a few long-term follow-up studies have been corroborated by control PSG documenting the persistence of therapeutic efficacy. Because OSA usually requires lifelong therapy, long-term follow-up is of the utmost importance.⁵ The present study was conducted to assess the role of efficacy of a Karwetzky activator in pediatric patients with OSA.

MATERIALS & METHODS

The present study was conducted in the department of Pedodontics and Orthodontics. It comprised of 54 patients OSA patients of both genders. The study was approved from institutional ethical committee. Parents of children were informed regarding the study and their consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were polysomnographically diagnosed with

mild-to-moderate OSA. The Karwetzky activator was given in patients with obstructive sleep apnea (OSA). They were initially treated successfully with this appliance. Further polysomnographic registrations at 6 to 12 weeks (T1) after the start of treatment, 6 to 12 months (T2) and 18 to 24 months (T3) later were performed for each patient wearing the appliance. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 54		
Gender	Boys	Girls
Number	24	30

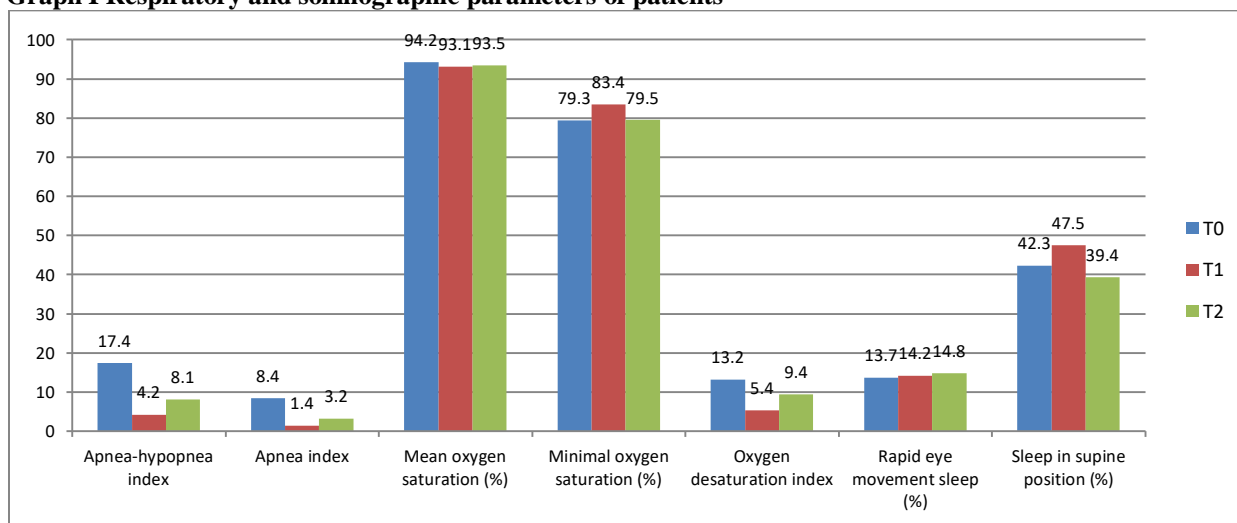
Table I shows that out of 54 patients, boys were 24 and girls were 30.

Table II Respiratory and somnographic parameters of patients

Variables	T0	T1	T2	T3	P value
Apnea-hypopnea index	17.4	4.2	8.1	8.3	0.01
Apnea index	8.4	1.4	3.2	4.6	0.02
Mean oxygen saturation (%)	94.2	93.1	93.5	94.1	0.82
Minimal oxygen saturation (%)	79.3	83.4	79.5	80.6	0.94
Oxygen desaturation index	13.2	5.4	9.4	9.2	0.05
Rapid eye movement sleep (%)	13.7	14.2	14.8	15.2	0.72
Sleep in supine position (%)	42.3	47.5	39.4	45.2	0.92

Table II, graph I shows that mean Apnea-hypopnea index at T0 was 17.4 events/hour, at T1 was 4.2 events/hour, at T2 was 8.1 events/hour and at T3 was 8.3 events/hour. Apnea index was 8.4, 1.4, 3.2 and 4.6 events/hour at T0, T1, T2 and T3 respectively. Mean oxygen saturation was 94.2, 93.1, 93.5 and 94.1% at T0, T1, T2 and T3 respectively. Minimal oxygen saturation (%) was 79.2, 83.4, 79.5 and 80.6 at T0, T1, T2 and T3 respectively. Oxygen desaturation index was 13.2, 5.4, 9.4 and 9.2 at T0, T1, T2 and T3 respectively. Rapid eye movement sleep (%) was 13.7, 14.2, 14.8 and 15.2 at T0, T1, T2 and T3 respectively. Sleep in supine position (%) was 42.3, 47.5, 39.4 and 45.2 at T0, T1, T2 and T3 respectively. The difference was significant (P< 0.05).

Graph I Respiratory and somnographic parameters of patients



DISCUSSION

Many studies suggest more diagnostic tools and options should be considered, such as parents reports, clinical examination, questionnaires addressing behavioral and cognitive information and 3D imaging studies.⁶ Adenotonsillar hypertrophy is known to be the main risk factor for the disease followed by obesity, neuromuscular disorders and craniofacial anomalies.⁷ The gold standard treatment for children is removal of the oropharyngeal lymphoid tissue. Treatment during childhood is believed to be crucial; the delay in its recognition may play a negative influence on the quality in their adult life.⁸ The most common non-surgical types of treatment include devices of air pressure (CPAP or BPAP), however, they are expensive and little accepted by children.⁹ Recurrence of the clinical condition can happen after adenotonsillectomy and it is believed to be due to concomitant craniofacial problems, among others. These alterations can be easily recognized and treated by the orthodontist. The persistence of OB and PS during the growing and developmental period may lead or exacerbate dental skeletal changes.¹⁰ The present study was conducted to assess the role of efficacy of a Karwetzky activator in pediatric patients with OSA.

In this study we found that out of 54 patients, boys were 24 and girls were 30. Rose et al¹¹ found that the mean apnea-hypopnea index decreased significantly from 17.8 events per hour at the baseline registration to 4.2 events per hour ($P < .001$) after 6 to 12 weeks of treatment. After 6 to 12 months, the apnea hypopnea index was 8.2 events per hour. The index remained at this level 18 to 24 months later, with 8.3 events per hour. Mean oxygen saturation was not improved with the activator, but the number of desaturation had decreased at the 6-to-12 week review. Again, the improvement declined with time, but the number of oxygen desaturation was still significantly decreased at 18 to 24 months ($P < .01$). Although the respiratory parameters remained statistically improved throughout the study ($P < .01$), sleep architecture did not change statistically. In most patients, therapeutic efficacy was maintained at the 2-year follow-up, although there was a tendency for effectiveness to fall over time.

We found that mean apnea-hypopnea index at T0 was 17.4 events/hour, at T1 was 4.2 events/hour, at T2 was 8.1 events/hour and at T3 was 8.3 events/hour. Apnea index was 8.4, 1.4, 3.2 and 4.6 events/hour at T0, T1, T2 and T3 respectively. Mean oxygen saturation was 94.2, 93.1, 93.5 and 94.1% at T0, T1, T2 and T3 respectively. Minimal oxygen saturation (%) was 79.2, 83.4, 79.5 and 80.6 at T0, T1, T2 and T3 respectively. Oxygen desaturation index was 13.2, 5.4, 9.4 and 9.2 at T0, T1, T2 and T3 respectively. Rapid eye movement sleep (%) was 13.7, 14.2, 14.8 and 15.2 at T0, T1, T2 and T3 respectively. Sleep in supine position (%) was

42.3, 47.5, 39.4 and 45.2 at T0, T1, T2 and T3 respectively.

Villa et al¹² evaluated the clinical use and tolerance of FA for OSA treatment in 32 children at an average age of 7.1 ± 2.6 years, 20 boys and 12 girls who had OSA symptoms an $AHI > 1$ event per hour and malocclusion. Randomly were selected 19 patients (SG) with $AHI = 6$, which used the FA and the remaining patients formed the CG. After the treatment, the polysomnography exam showed the SG achieved a significant decrease in the AHI compared to the same index at the treatment beginning, and the CG showed no change. Clinical symptoms examination before and after the appliance use showed that 7 of the 14 subjects, had reduced 2 points in the score of respiratory symptoms, and 7 had solved the main complaints of respiratory symptoms compared to the CG which continued with baseline symptoms. Therefore, they concluded the treatment of OSA with FA is effective and well tolerated.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that Karwetzky activator is useful in management of mild-to-moderate OSA.

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