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Introduction

Cervical headgear appliances are commonly used for Class II correction. Patients often experience a variety of symptoms during the first days of headgear wear, which subside fast thereafter. These symptoms may include both sleep disturbances and sleep-related complaints.

Poor sleep can affect patient's well-being and lead to poor academic performance. The aforementioned findings make it mandatory to investigate the effect of these appliances on patients' sleep in order to maintain a quality of life while undergoing orthodontic treatment.

Aim

The study goals were to assess:

- the effect of the cervical headgear on sleep attributes (quantity/quality), and
- whether compliance with this orthodontic appliance is associated with sleep-related issues.

Subjects and Methods

Subjects: 26 patients; 9 males and 17 females (12.4±1.68 y)

Methods:

• Inclusion criteria:

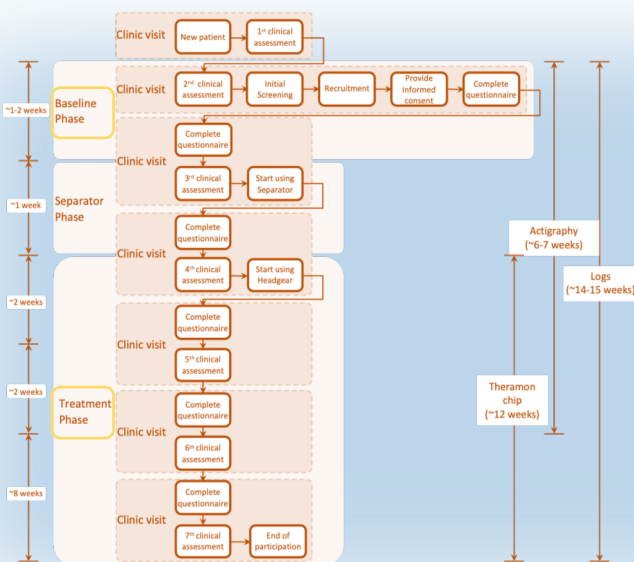
- treatment with cervical headgear
- no previous orthodontic treatment
- no sleep-related pathological conditions
- no sleep-related medication

• All patients received treatment with cervical headgear having an embedded **TheraMon microsensor**.

• Sleep was assessed by **wrist-worn actigraphy** at the baseline and treatment phase for all subjects. (Control and experimental period)

• **Questionnaires** used:

- Epworth Sleepiness Scale (ESS) to assess average daytime sleepiness.
- Athens Insomnia Scale (AIS) to assess severity of insomnia.
- Oral health-related quality of life (OHRQoL) was assessed by the oral health impact profile (OHIP-14).



Results

- Patients slept on average 7.35±0.42 hours/day. Compared to the lowest sleep duration recommended for their age group, patients had an average chronic sleep deficit of 1.4±0.49 hours/day.
- Patients wore the headgear in 90.9% of the days for 10.4±4.17 hours/day. Only 7 (28%) of the patients, however, reached or exceeded the wear-time recommendation of 12 hours/day.

Interestingly, higher OHIP-14 scores were correlated with fewer hours of wearing the headgear ($\rho = -0.382$, $p = 0.066$). However, mixed effects regression analysis showed that AIS scores did not differ among study phases ($p = 0.267$).

Correlation analysis among study variables based on Spearman's rho

	Age	Sex ²	ESS score ¹	AIS score ¹	Daily sleep duration	Daily sleep deficit	OHIP-14 score ¹
Sex ²	0.077						
ESS score ¹	0.192	0.518**					
AIS score ¹	0.297	-0.005	0.464*				
Daily sleep duration	-0.272	0.167	0.180	-0.247			
Daily sleep deficit	-0.239	-0.189	-0.067	0.061	-0.709***		
OHIP-14 score ¹	0.454*	0.001	0.515**	0.599**	0.116	-0.147	
Compliance	-0.120	-0.141	-0.320	-0.189	-0.033	-0.048	-0.382

Unadjusted statistical significance: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Bold unadjusted p-values are statistically significant based on post-hoc assessment with the Benjamini-Hochberg False Discovery Rate controlling procedure.

¹ Responses from the initial questionnaires were not included in the calculation of the aggregated ESS, AIS, OHIP-14 scores.

² Rank-biserial correlation

Conclusions

- We did not identify any serious sleep-related issues caused by cervical headgear wear.
- Patients were substantially sleep-deprived throughout the study.
- We did not find any correlation between compliance with this orthodontic appliance and sleep-related issues.

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