

HYPERACTIVE BEHAVIOR AND CLINICAL FINDINGS ASSOCIATED WITH SLEEP-DISORDERED BREATHING

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ABSTRACT

Purpose: The aim of this study was to determine if there is a correlation between hyperactivity and clinical findings associated with sleep-disordered breathing.
Methods: An observational study was conducted of 72 children ages 6-12 years old during dental examinations at the UTHSC pediatric dental clinics. Study participants' guardians completed the Strengths and Difficulties Questionnaire (SDQ) to measure patient behaviors on five scales: emotional problems, conduct problems, hyperactivity/inattention, peer problems, and prosocial. A functional airway evaluation screening tool (FAIREST-6) was used to assess risk for development of sleep-disordered breathing. SDQ hyperactivity scores were then correlated with FAIREST-6 scores using Spearman's correlation and cross-tabulation analyses.
Results: 12.5% of participants were considered high risk for developing sleep-disordered breathing. 16% of study participants were categorized as high hyperactivity. Spearman's analysis showed no significant correlation between a high Fairst-6 score and high hyperactivity.
Conclusion: There is no significant correlation between the study population's oral clinical findings associated with sleep-disordered breathing and hyperactivity.

INTRODUCTION

Sleep is vital for an individual's well-being and growth. However, many things can cause sleep disturbances, including sleep-disordered breathing (SDB). SDB is when an individual's standard breathing patterns and ventilation are disrupted during sleep and can range from mild snoring to severe obstruction, known as obstructive sleep apnea (OSA). OSA in adults is well-understood and has been well-documented in the literature; however, pediatric OSA presents with many complications in its' diagnosis and, therefore, continues to be misunderstood. Many oral and facial clinical findings have been associated with pediatric SDB. The FAIREST-6 assessment is a published assessment tool comprised of 6 orofacial clinical findings, evaluating a child's risk for developing SDB. Dentists, physicians, and other health professionals are encouraged to use this screening tool.

It is also known that consistent disturbance in sleep can have many adverse long-term effects associated with both physical health and behavior, including attention-deficit hyperactivity disorder (ADHD). ADHD is characterized by three primary symptoms: inattention, impulsivity, and hyperactivity. SDB is considered to be one of the most common comorbid conditions in children with ADHD with snoring resulting in a two-fold increase in a child's odds of an ADHD diagnosis and OSA resulting in a four-fold increase.

PURPOSE

Early recognition of SDB and hyperactive behavior is essential to a child's growth and development. Pediatric dental professionals have the unique opportunity to simultaneously evaluate and recognize oral clinical findings associated with sleep-disordered breathing and behavior. As dental professionals, we aim, not to diagnose children with sleep disorders or neurobiological conditions, but to recognize the signs and associated symptoms with each condition and refer them to specialists early to receive the intervention to develop and succeed. The purpose of this study was to determine if there is a correlation between oral clinical findings associated with SDB and hyperactivity.

MATERIALS AND METHODS

Patients presenting to the UTHSC Dunn and LeBonheur pediatric dental clinics for new patient and recall exams between the ages of 6-12 years old in the mixed dentition stage were asked to participate in this study. The guardian signed a consent form for their child's participation. Patients with craniofacial defects, prior or current orthodontic therapy, prior tonsillectomy, and/or prior oral or maxillofacial surgery were excluded.

Calibrated 2nd year UTHSC pediatric dental residents utilized the FAIREST-6 assessment (Figure 1) to evaluate the patient's risk for developing sleep-disordered breathing. The presence or absence of the following 6 oral clinical findings were evaluated and documented: mouth-breathing, mentalis strain, tonsil hypertrophy, ankyloglossia, dental wear, and narrow palate/dental crowding/high arch. The score of the FAIREST-6 is equal to the number of present clinical findings identified. Fairst-6 scores 0-2 were considered "Low" risk and 3-6 were considered "High" risk for developing SDB.

MATERIALS AND METHODS

1. MOUTH BREATHING
 NO YES
 Difficulty with exclusive nasal-breathing for 3+ minutes?

2. MENTALIS STRAIN
 NO YES
 No Mentalis-Strain vs. Mentalis-Strain

3. TONSIL HYPERTROPHY
 <50% >50%
 Tonsil Coverage: 0-25%, 25-50%, 51-75%, 76-100%

4. ANKYLOGLOSSIA
 NOT RESTRICTED RESTRICTED (GRADE 3-4)
 TRMR-TIP: Tongue Range of Motion Ratio with Tongue to Incisive Papilla
 Grade 1 >80%, Grade 2 50-80%, Grade 3 <50%, Grade 4 <25%

5. DENTAL WEAR
 NO YES
 Attrition, Abfraction, Gum Recession
 Are there visible signs of dental wear?

6. NARROW PALATE
 NO YES
 Signs of dental crowding, high arch, and/or narrow palate?

Figure 1: FAIREST-6 Assessment. Each of these six factors is an independent risk factor for developing sleep-disordered breathing.

- Guardians completed the Strengths and Difficulties Questionnaire (SDQ), a validated behavioral screening tool comprised of 25 questions measuring a child's difficulties (emotional problems, conduct problems, hyperactivity, and peer problems) and strengths (prosocial). Investigators hand-scored the assessment using the SDQ scoring for children ages 4-17 years old. Hyperactivity scores 0-6 were considered "Low" and scores 7-10 were considered "High."
- FAIREST-6 scores and SDQ scores were de-identified and placed in a protected excel document.
- Cross-tabulation and Spearman's correlation analyses were performed.

RESULTS

72 children (mean age=8.3 years old; 37 females, 35 males) participated in this study. Cross-tabulation analysis is represented by Figure 2. Correlation coefficient (r)=0.05. 12 individuals (16% of the study population) fell in the "High" hyperactivity group, while 60 fell in the "Low" group. 9 individuals (12.5% of the study population) were regarded as "High" risk for developing SDB per the FAIREST-6 assessment, while 63 individuals were considered "Low" risk. According to Spearman's correlation analysis, strong positive correlations were noted between multiple individual difficulty parameters of the SDQ. Strong negative correlations were noted between strengths of the SDQ (Prosocial) and multiple difficulty parameters. Analyses of individual difficulty parameters of the SDQ (emotional problems, conduct problems, hyperactivity, peer problems) and strengths (prosocial), along with FAIREST-6 scores were completed. No significant correlations exist among the individual parameters of the SDQ and FAIREST-6 scores. See Table 1.

RESULTS

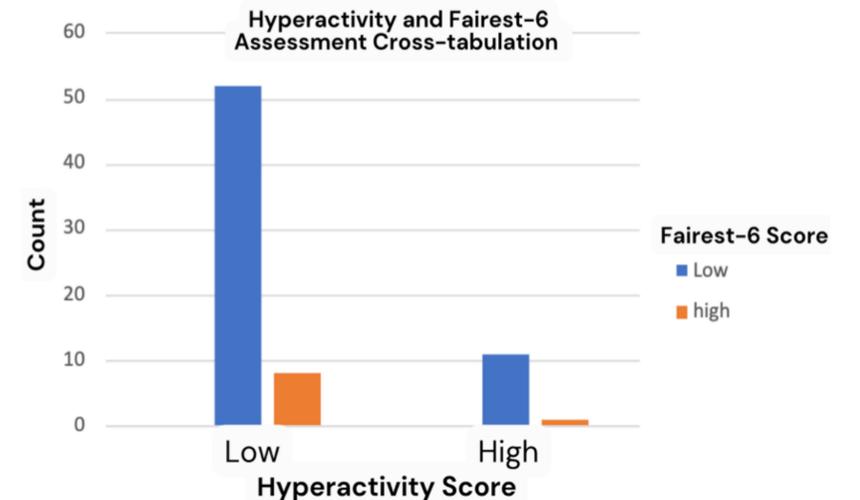


Figure 2: Cross-tabulation of the SDQ hyperactivity score and FAIREST-6 assessment score. Correlation coefficient (r)=0.05.

	EMOTIONAL PROBLEMS	CONDUCT PROBLEMS	HYPERACTIVITY	PEER PROBELMS	PROSOCIAL
EMOTIONAL PROBLEMS	1.00	.336**	.355**	.270*	-0.22
CONDUCT PROBLEMS	.336**	1.00	.451**	.367**	-.481**
HYPERACTIVITY	.355**	.451**	1.00	.270*	-.386**
PEER PROBELMS	.270*	.367**	.270*	1.00	-.312**
PROSOCIAL	-0.22	-.481**	-.386**	-.312**	1.00
FAIREST-6	-0.12	-.295*	-.17	-.10	0.12

Table 1: Spearman's correlation analysis of individual parameters of the SDQ and overall FAIREST-6 assessment scores. Strong correlation is represented by a double asterisk**. Weak correlation is represented by a single asterisk*.

CONCLUSION

- There is no significant correlation between oral clinical findings associated with sleep-disordered breathing and hyperactivity in the study population.
- Future studies are needed to continue to explore the relationship between oral clinical findings associated with sleep-disordered breathing and hyperactivity.
- Measures other than the FAIREST-6 assessment might be necessary to determine an association between oral clinical findings associated with SDB and hyperactivity.

FUTURE DIRECTIONS

- Larger sample size
- Increase enrollment in subjects with High Fairst-6 score or Hyperactivity score
- Recruit participants with a diagnosis of ADHD
- Consider looking at only the objectively defined measures of the FAIREST-6 assessment