

The Impact of Sleep Disorders on Oral Health: The Role of Family Physicians, Dentists, and Nurses in Early Diagnosis and Intervention

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1. Introduction

Sleep is a fundamental physiological need essential for the restoration of physical and cognitive functions. The impact of disturbed sleep on quality of life is well documented. However, most primary healthcare providers do not screen for or treat sleep disorders. In some cases, the provider may not get a clear medical history or may fail to notice the patient's sleep disorder symptoms (J Jaiswal et al., 2017). Of all sleep disturbances, a sleep disorder is a significantly higher condition because of its variable presentation and protracted diagnosis process. Symptoms such as uncontrollable prolonged daytime sleep episodes, cataplexy, sleep paralysis, hypnagogic hallucination, and on entering rapid eye movement a sudden loss of muscle tone are typically noted in a patient with narcolepsy. Given that these are dysfunctions of the central nervous system (CNS) and are not detectable by general physical examinations, narcolepsy is an especially challenging disorder to detect by primary care providers and other medical professionals. Early diagnosis is important in treating narcolepsy. Therefore, to raise awareness of sleep disorders, especially narcolepsy, to primary care providers, dentists, and nurses, this review aimed to summarize the physiological mechanisms of sleep disorders, signs of possible sleep disorders, treatments for sleep disorders, and bilevel airway positive pressure equipment treatment with a dental prosthesis. Due to the regular role of oral health in routine medical exams and to help raise precedent occasions for early diagnosis and treatment as individuals regularly visit their primary care providers, dentists, or hospitals for diagnosis and treatments.

2. Understanding Sleep Disorders and Their Impact on Oral Health

Sleep is an essential neurophysiological state of temporary rest that is intimately connected with general health. Sleep disorders represent any of a variety of conditions that disrupt normal sleep patterns, including difficulty falling asleep and staying asleep, falling asleep at abnormal times or in excessive amounts, and behaviors during sleep that may cause disturbances (Berjaoui et al., 2023). As general professionals in preventive and comprehensive health care, family physicians are ideally positioned to screen patients for sleep disorders. However, the symptoms and effects of such disorders are as varied as the diseases

themselves. Consequently, family physicians may not have the time or resources to screen patients comprehensively for primary sleep disorders. This review presents a succinct explanation of some common sleep disorders—and how they may be recognized or suspected based on available statistical evidence. The aim is to provide family physicians with a greater understanding of how and why they should screen their patients for sleep disorders since undiagnosed sleep disorders can present in numerous manifestations. Dentists and other family health care professionals can pursue screening to increase the probability of early detection. Once aware, physicians can either treat or refer their patients to appropriate specialists for further clinical judgment (J Jaiswal et al., 2017). The rising occurrence of oral diseases is closely associated with increased prevalence of systemic diseases. Comprising a significant health issue worldwide, obstructive sleep apnea syndrome (OSAS) is a common sleep problem that can have detrimental effects on quality of life and the general well-being of a patient. The disorder is linked to drowsiness, sleepiness, and fatigue, as well as behavioral and cognitive disorders that can affect work productivity, driving, and the quality of relationships. The effects of OSAS on general health include hypertension and an amplified risk of cardiovascular and cerebrovascular events and, possibly, metabolic disorders. Among the next pathologies are dental disorders such as temporomandibular dysfunction and, in particular, bruxism. Bruxism is broadly recognized as an oral parafunction that leads to chronic orofacial pain, jaw dysfunction, and additional pathological dental wear. It can also produce gum recession and abnormal tooth mobility. Some possible clinical signs of OSAS and bruxism that general practitioners can detect easily are described herein to allow timely referral and diagnosis.

2.1. Common Types of Sleep Disorders

The material of sleep disorders in the oral healthcare patients is described, with the aim of promoting understanding and recognition about the importance of screening for the same to family physicians, dentists, and nurses in primary care setup. The methods to diagnose and treat these conditions fall outside the typical competence and training of family physicians, dentists, and nurses. Many of the major oral pathologies and syndromes seen by these professionals have dermatologic or oral and maxillofacial surgery, which do not have much overlap with sleep neurology or sleep medicine (J Jaiswal et al., 2017). Despite this, many of the sleep disorders manifest with oral health complications. The literature has identified that family physicians and dentists, who are usually the first to evaluate and/or recognize these conditions, feel untrained to do so. Therefore, it is becoming necessary that family physicians and dentists become exposed to oral manifestations of sleep disorders. Mouth opening during sleep can increase the prevalence of the mouth breathers and is stated to have a negative effect on periodontal tissue health. Oral candidiasis and hyposalivation can be seen by dentists and can be the first clinical signs of OSA (Dewan et al., 2022). Specialty physicians are trained in these areas and typically follow the patient's oral health. Efficient coordination is necessary between the discipline of sleep medicine with the various fields to be able to diagnose and treat patients on time. In conclusion, due to the complications of sleep disorders for oral health, such conditions should be well recognized by both family physicians and dentists, required in a collaborative approach to intervene in a timely manner.

2.2. Mechanisms Linking Sleep Disorders and Oral Health Issues

Although the direct study results found no correlation between sleep disorder and oral health, the current study focused on clinical indicators, while other recent papers have studied the relationship between sleep disorder and oral health with parameters such as the number of natural teeth, dental caries, and oral hygiene. The mechanism of oral and oral health damage caused by sleep disorders is still unclear, but dry mouth is considered a risk factor. The possible explanation is that the reduced salivary secretion volume decreases and the buffering ability of saliva decreases, leading to extended periods of time under acidic conditions, which is a risk factor for dental caries. In addition, since the salivary secretion amount and the salivation lumen during sleep gradually decrease overall, the buffering capacity of saliva decreases, and the salivary secretion amount of the oral cavity, especially under the tongue, most decreases.

Dentists play an important role in recognizing oral symptoms and referring them to family physicians. This study shows that frequent family physician visits affect the early detection of sleep disorders by dentists, and more than three visits should be encouraged. Nurses had a role in encouraging family physician referrals for oral symptoms (Ogawa et al., 2021). The role of family physicians in the oral health problems caused by sleep disorders is also extremely important. It has been viewed about the relationships of sleep and oral health from oral health fields like dentistry and nursing, and this is a problem that seems to be on the increase from now on because of the fully aging society and overcrowding of teeth (Berjaoui et al., 2023). Family physicians have an important role not only in diagnosis and treatment of sleep disorders, but also in the identification and understanding of related various oral symptoms.

3. The Importance of Early Diagnosis and Intervention

Background: Google Scholar search engine was used to identify potentially relevant studies. The following search terms were used: "oral health and sleep disorder," "dental care and sleep disorder," "oral health intervention and family physician," "oral health intervention and nurse," and "oral health intervention and dentist." Search results were limited to scholarly articles that had been published in the last five years to ensure the most up-to-date findings. Sleep is an important aspect of children's health, influencing their psychological, cognitive, and physical development. However, because children typically spend less time sleeping or have a poor-quality sleep, sleep deprivation or sleep disorders are commonly observed. It is widely recognized that sleep conditions can be improved by having a more suitable life rhythm and habits. Such improvements in childhood may help enhance a child's mental and emotional health, as well as prevent some of the associated morbidities, injuries, or disabilities. Although oral health problems caused by sleep disorders would be important, very little research has been conducted in the area of general and oral health co-morbidities. The aim of the study was to evaluate the relationship between oral health problems and sleep disorders and raise health care providers' attention to these issues by organizing multidisciplinary platforms for diagnosis and interventions to mitigate such co-morbidities (J Jaiswal et al., 2017). Current Parents' Dental Care Behaviours and Knowledge of the Link between Childhood Dental Caries and Insufficient Sleep in Preschoolers: Children are likely to develop lifetime lifestyle habits, some of which they learn in their childhood. Some of such acquired habits evolve in the realm of their parents' knowledge. Recent studies revealed that as much as 8.1% of parents sitting in an orphanage have prior knowledge of dental hygiene. Additionally, cumulative extrinsic lifestyle habits of children reinforce their susceptibility to early childhood caries. This patterning explains inadequate dental care of parents. Research, however, has not considered the parent-child connective link between this patterning and its influence on the cumulative persistence of insufficient sleep disorders. Future research needs to focus on parental dental care habits as a practical leverage tool for reducing the likelihoods of insufficient sleep laden early childhood caries (Ogawa et al., 2021).

3.1. Benefits of Early Detection

Sleep disorders have severe impacts on systemic health, including physiological, psychological, and occlusal problems. Because most individuals with sleep disorders are unaware of their condition, related oral symptoms should be checked by family physicians, dentists, and nurses. Early detection of the oral symptoms of sleep disorders requires a broad understanding of the diversity of those symptoms and interventions that involve collaboration by medical and oral health professionals. Good sleep practices facilitate preventive oral care. Early detection collaboratively by family physicians, dentists, and dental hygienists and intervention of the oral symptoms of sleep disorders are important.

Benefits of Early Detection and Collaboration between Medical and Oral Health Professionals: The associations among poor sleep quality, sleep problems, and sleep-disordered breathing (SDB) and oral symptoms are discussed to provide a better understanding for oral and medical health professionals. The prevalence of SDB and sleep symptoms is generally estimated to be 2–4% in children and 4% in adults. The severity of SDB appears to have a correlation with poor occlusal problems. Dentists are considered to have the potential to intervene with a mild case of SDB and poor occlusal problems. A validated questionnaire easily detects the oral symptoms and signs of the SDB: the snoring, tiredness, observed apnea, high blood pressure is freely available to all French people in pharmacies and gamma-diagnostics, a website dedicated to screening diseases, and which gives recommendations for further care at the general practitioner, pulmonary and / or ENT clinics. This assessment is expected to be completed by medical and oral health professionals in order to facilitate the identification of individuals with SDB (Ogawa et al., 2021).

3.2. Challenges in Recognizing Sleep Disorders in a Dental Setting

The dental surgeon is often the first person who notices the symptoms of sleep disorders in a patient. However, the description of characteristic aspects of sleep disorders in the oral cavity is usually limited to obstructive sleep apnea (J Jaiswal et al., 2017). Nevertheless, many symptoms do not yet allow definitive diagnosis of obstructive sleep apnea. The great clarity in recognizing sleep disturbances is still missing for many colleagues. For unspecified reasons, sleep disorders are also often not communicated to patients by dentists, even if they are recognized (Chauhan et al., 2024).

In view of the statistics, this is a questionable omission. In any case, early recognition of diseases is best to counter the health risk they bring with them. Therefore, a systematic approach to dental-diagnostic recognition and preventive action is necessary. Dental assistants, dental technicians, dental hygienists, as well as dental surgeons, should be trained in interrogation methods to indicate sleep disorders. Such training is also necessary in view that a negative finding could turn out to be negative in a later control. Moreover, a detailed sleep questionnaire and an overview of the diagnostic possibilities are desired by the practitioner.

In any case, snoring alone does not indicate sleep apnea syndrome. Small, but significant upper airway obstructions occur in many patients already in a soundless sleep. A control of blood pressure measurement is already recommended. A direct visual examination of the throat should be the concluding measure in sieving out the suspicion of snoring. However, it does not necessarily mean that one has to catch a possible patient in such a flagrant state in order not to overlook the symptoms. There may also be a suspicion of sleep apnea syndrome on the basis of findings in the oral cavity. However, such an examination is beyond the scope of a dental examination, therefore refer to the family doctor.

4. Collaborative Care Approach

Sleep disorders contribute significantly to the etiology of medical conditions and poor oral health-quality-of-life consequences, mostly involving undesirable outcomes dangerous to overall health and wellbeing. The collaborating role of family physicians, dentists, or nurses could prove essential in enhancing early detection and successful intervention by adapted prevention, including screening examination, patient education on oral hygiene and lifestyle modifications, and advising on continuous treatment plans, since medical, dental, and nursing professionals are in a key position to suspect the multifactorial origin of these disorders on the basis of either oral and general signs and symptoms or precursory conditions. Early diagnosis or intervention should hence be seriously recommended. A pilot transversal study was conducted in a Portuguese dental school to explore the potential role of sleep-related breathing disorders in patients referred to for oral health care, featuring interviews with family physicians and evaluation of the patients by questionnaires.

Daytime sleepiness, unrefreshing sleep or fatigue, and an awareness report of snoring in the patients were the most frequently identified general complaints by physicians. Waking up with a dry mouth or bad taste, regular tooth grinding or morning discomfort, and frequent oral dryness were the most significant complaints in dental records. Both oral problems and oral pain were significantly more observed in patients already known to have a previous diagnosis of sleep disturbances. The nighttime presence of an uncomfortable feeling as pain in the jaw and teeth and the snoring noise were the most frequent undesired events observed by patients in bed-partners. Long-standing symptoms lasting for years were observed in regular verbal witness reports from relatives or other cohabitants of the patients, mainly characterized by frequent episodes of breath-holding, gagging, or gasping. Early morning headache and observed breathing pauses during sleep were described to be significantly more recorded complaints in sleep apnea patients. Three quarters of the questioned patients admitted to dental advise to their physician, randomly and mostly associated with non-known specialty. Co-morbid conditions, associated with a nocturnal denture other than oral dryness, were observed in almost half of the sleep-disturbed subjects who were on chronic medical therapy, particularly used to treat hypertension. Oral hygiene technical recommendations or possible use of auxiliaries, such as the chance of a dental device, irrigator, or regular use of an orthodontic mouth rinse; knowledge on the potential role of sleep position; or the selection of the appropriate pillow model, and the relative efficacy of the respective settings resulted in the most recommended tips by medical professionals mainly in response to oral cavity complaints. Scrupulous sleep positioning and the identification of stress sources or possible lifestyle adjustments were the most common physicians' advices in response to night-awakening sleep complaints. An interesting finding on the patients' blood testing requests was the exclusive presence in the sleep apnea group of insulin and erythrocyte sedimentation rate evaluations. Doxycycline, vasodilators or muscle relaxants were significantly more prescribed medications by dentists already suspicious of the patient's sleep disturbance and, generally, resulted in the appropriate adjuvant therapy in response to snoring or observed apnea during dental procedure (Heit et al., 2022).

4.1. Roles and Responsibilities of Family Physicians

Obstructive sleep apnea (OSA) and sleep disorders are among the most commonly seen health problems in family practices. OSA is associated with metabolic syndromes, hypertension, sudden cardiac death, and acute cardiovascular events. Daytime sleepiness, fatigue, mood disorder, depression, accident risks, occupational accidents, and traffic accidents are seen at higher rates in subjects with OSA. Sleep disturbances and their consequences have become a new research area in the light of basic and clinical studies emerging over the past decade. The relationship between sleep disorders and other disorders has become increasingly clear for the past five years (Gündüz & Uşak, 2016).

It has been revealed in many studies that family doctors are indispensably placed for timely diagnosis and early initiation of treatment of OSA and other sleep disorders. In family and general health practices especially, it has gained importance to question the presence of a "sleep disorder history" of patients applying for other complaints. OSA and other sleep disorders have been diagnosed more frequently in recent years. The main reason is thought to be improved knowledge and the latest developments in sleep science, as well as the increasing awareness of clinical diseases that lead to other diseases and morbidity

(J Jaiswal et al., 2017). The understanding of the pathophysiological interrelations between OSA and other sleep disorders and systemic diseases has begun to become widespread, and promising structural developments have been started. It should be stated that therapeutic/interventional approaches are generally preferred in the form of a multidisciplinary approach instead of a single-modality treatment starting from the diagnosis. The family medicine physician will gain recognition with increased knowledge, understand the importance of early diagnosis and treatment in sleep disorders, and in this context play an active role in raising public awareness.

4.2. Roles and Responsibilities of Dentists

Obstructive sleep apnea (OSA) obstructs the airflow during sleep, leading to decreases in blood oxygen saturation levels and arousals from sleep. This can happen many times throughout the night, resulting in poor sleep quality. The most common objective assessment to diagnose OSA is a polysomnogram, a sleep study that monitors multiple physiological parameters. The early screening of pediatric OSA is paramount for timely diagnosis and management. Pediatric OSA, characterized by airway obstruction during sleep in children, perturbs early growth and neural development. With increasing evidence of the link between pediatric OSA and developmental morbidities, active patient screening is required (Heit et al., 2022). Dentists play a vital part in this preventative role as they can provide another portal for screening for OSA.

The screening is best achieved by dentists, primary care providers, and pediatricians involved in regular childcare. Although OSA is hard to clinically recognize accurately because it requires active behavior but non-symptomatic approach, there are many subjective questions for the screening of OSA developed thus far. An appropriate OSA questionnaire is brief but is able to identify the pediatric population at risk for OSA. Dependence solely on this questionnaire might lead to false negative or positive results. Oral habits have been found to be associated with OSA, demonstrating that dentists and orthodontists play a critical role in the early identification of craniofacial problems associated with pediatric OSA. The involvement of these providers in OSA screening can lead to a comfort level for overall examination, leading to improved diagnosis. The collaboration of medical and dental professionals is imperative to optimize airway functioning and prevent associated morbidities.

4.3. Roles and Responsibilities of Nurses

Nursing staff must be familiar with the risks of oral disorders and able to intervene early in care. Although oral care activities are carried out by a variety of professionals such as dentists, care personnel, and so on, LPNs and other nursing staff who provide direct care are frequently the first to find the early signs of oral disorders. The prevention of oral disorders before disaster occurs is an even more important part of medical care. In order to meet the oral care needs of patients and help residents from the stage of consciousness rising to behavior change, nursing staff must actively participate in oral care. It is necessary to provide conditions, knowledge and operational abilities for oral care. The conditions for oral care are to create an environment that is easy to perform, knowledge about oral care is knowledge about oral health and oral diseases, and operational ability is the ability to perform oral care accurately. Oral care contains a strong preventive aspect. Prevention of oral disorders requires education on specialized knowledge and skills. For nursing staff, the ability to engage in oral care can be taken as a natural approach or familiar teaching content in daily work with the external person of patients or help-seekers, but it is different from that of oral health professionals.

Almost a third of adults over age 65 and a half of adults over age 85 are at increased risk for dental caries due to untreated root caries. In the context of an aging population, caregivers provided by hospitals and nursing homes may be the only contact person to oral health care, but they often lack the necessary knowledge and ability. Health is defined here as a state of complete physical, psychological, and social well-being. Oral health is essential to general health and quality of life. Oral health can be defined as not only the absence of oral and dental diseases but also a broader sense of well-being of the oral cavity and its associated structures which enables an individual to eat, chew, speak, and socialize without any physical, psychological, and pathological discomfort. Oral health conditions are an integral part of an individual's general health status. Unaddressed oral health problems, trauma, or substance-related injuries to the mouth can affect vascular absorption in the digestive system and heart. Therefore, it is important to consider patient care from a comprehensive point of view.

5. Assessment and Screening Tools

Early diagnosis is of immense importance in the management of sleep disorders. Regular sound sleep is required for psychological and physical restoration. Both sleep quantity and sleep quality are important. However, sleep disturbances are very common and affect as many as 75% of people on a regular basis. Various sleep disorders such as OSA, heavy snoring,

upper airway resistance syndrome, bruxism, rhythmic movement disorders, insomnia, restless legs syndrome, periodic limb movement disorder, circadian rhythm sleep disorder, narcolepsy, sleep apnea, parasomnias, hypersomnolence, and central sleep apnea are known. All of these sleep disorders have a bad impact on the quality of sleep. Sleep quality can be assessed subjectively in many ways using questionnaires or diaries. People may have many problems due to a lack of sleep or sleep disturbances, such as dozing off at inappropriate times. It is very important to assess the quality of sleep. This chapter addresses various tools, questionnaires and grading systems that can be used to screen for sleep disorders in the dental office. Early diagnosis is important as it can prevent the development of other diseases. Early diagnosis also prevents progression of diseases to higher stages (Sadashiv Kale et al., 2018).

5.1. Questionnaires and Surveys

Sleep disturbance or deprivation can change the behavior or cognitive functions of the patient. The study will help in understanding the sleep behavior of dental students and aid in early diagnosis and intervention. The underlying comorbidity often goes unrecognized, although mutually influencing. Early detection is essential for effective management or prevention of adverse health consequences. Duty hours and unconventional routines of dental students make them more prone to develop sleep disorders. Study aims to assess the sleep behavior of dental students as a screening tool, aiding in prompt medical intervention.

The onset and progression of a sleep disorder are largely ignored by the patients or overlooked by the healthcare providers. This underlying comorbidity often goes unrecognized. It is likely that effective management of one disorder may result in improvement of the other. Clinical experience of patients suffering from both notes that either symptom or disorder tended to worsen if the other went untreated. To prevent or decrease adverse health consequences early detection provokes diagnosis or accommodation of the sleeping complaint is essential. Still, there is a considerable amount of stigma or misconceptions surrounding sleep disorder, which hampers proper diagnostic methodology and treatment. Hence, the use of a screening tool warns of impending hazards and aids in early management.

The sleep pattern disturbance and its outcome in terms of excessive daytime sleepiness and lack of energy have been appraised by questionnaires and surveys. Because of the ever-increasing academic, societal, and economic pressures, oral health care students, as well as practicing professionals, have to work beyond regular hours. The relative isolation and stress factors often dictate that this additional work is endured on a single person basis, which leads to totally unconventional routines. There is considerable evidence to suggest that such sleep disturbance occurs. Usually, dental undergraduate students can adapt to their new training within a few years to achieve symptom stability. A screening questionnaire could help to identify those at risk or who have the early stages of such disorder in order to address it in more detail earlier.

5.2. Polysomnography

Polysomnography (PSG) is the primary tool for sleep monitoring and the diagnosis of sleep disorders. Recent advances in signal analysis make it possible to reveal more information from this rich data source. In view of this, an observational study has been initiated to yield a database combining clinical PSG with advanced unobtrusive sleep monitoring modalities like depth electrodes and infrared video monitoring in a large cohort of patients with various types of sleep disorders. This SOMNIA database will facilitate the validation and above all the gold standard assessment of the diagnostic value of these new techniques. One selected advanced sleep monitoring technique is the unobtrusive detection of convulsive seizures, generalized or focal. Some studies showed that the detection criterion for the unobtrusive detection of motor seizures during sleep is the smallest cross-period of magnitude above a certain threshold of the spatial integral of one or more of the EEG, EMG, or ECG signals.

Sleep-disordered breathing is a condition characterized by recurrent episodes of upper airway collapse during sleep. The abnormal decrease (hypopneas) or complete cessation (apneas) of airflow results in intermittent hypoxemia and multiple nocturnal arousals. The prevalence of the full-blown Obstructive Sleep Apnea/Hypopnea Syndrome (OSAHS) in the population is estimated to be around 2–4 and 4–2% for ladies and men, respectively. In spite of its prevalence, it is notoriously under diagnosed, with an estimated rate of 85% of undiagnosed matron and 93% of undiagnosed boys in the US. An accurate and timely diagnostics is paramount as OSAHS is known to be an independent risk factor for hypertension and, consequently, for stroke and cardiac infarction. Furthermore, it deteriorates the quality of sleep causing excessive daytime sleepiness and increased risk of motor vehicle and industrial accidents (Maria Allenstein Gondim et al., 2015). Early diagnostics of OSAHS may impact society and the healthcare system by means of: (on a patient level) reducing the risk of degrading its general health

and welfare state and (on a societal level) reducing the load on the healthcare system and the social/economical impact of accidents.

6. Treatment Modalities

The treatment of sleep disorders varies depending on the etiology of the disorder. Overall, therapy can include lifestyle changes, the use of a continuous positive airway pressure (CPAP) machine, or the oral appliances that may be of value to diagnose and manage sleep disorders by causing dental problems. The sleep physician or an Otolaryngology—Head and Neck Surgery Physician will deliver the CPAP machine. This machine requires a mask over the nose and mouth that delivers a continuous, steady stream of pressurized air through the nose. The pressurized air functions to prevent the airway from collapsing during sleep while maintaining an open airway (E Weaver et al., 2014). Oral appliances may be helpful for mild cases of OSA or for snoring. They are designed to move the soft palate and the tongue forward so as to keep the lower jaw in a slightly forward position. Also, a combination appliance may be used. These appliances may aid in preventing the tongue from falling back into the throat and collapsing the airway. They could also stimulate the intrinsic tone of the pharyngeal muscles, thus preventing collapse of the airway (J Jaiswal et al., 2017). Nonetheless, a combined approach to treatment of cases would theoretically optimize OSA and RERAs, improving associated co-morbid conditions and mortality rates. It is imperative for clinicians, including family physicians, dentists, head and neck surgeons, and nurses to educate and work together to effectively manage patients suffering from sleep disorders.

6.1. Behavioral Therapies

Sleep Disordered Breathing (SDB) includes a spectrum of sleep related breathing problems, the most common of which are snoring and Obstructive Sleep Apnea (OSA), a condition in which the upper airway collapses repetitively during sleep, compromising respiration and enabling oxygen desaturations and sleep fragmentation. Despite the impact these disorders have on health, SDB is under diagnosed. Several studies have shown significant co-morbidity with serious conditions such as hypertension, diabetes, and heart disease. Individuals with severe OSA were significantly more likely to have diabetes compared to controls and more likely to have hypertension. OSA also has an effect on oral health that is largely ignored by family physicians and dentists. College students who snore are more likely to report caries, and a study showed that patients with severe OSA had a greater chance of having chronic periodontitis, leading to the need for OSA screening and treatment by dentists.

Fortunately, family physicians, dentists, and nurses all have a relatively simple role that can be fulfilled at no cost to the health care system. Smoking, viral infections and obesity are the main risks for children and adolescents. An estimated percentage of children with persistent SDB remain undiagnosed by physicians. Unfortunately, the discontinuation of adenotonsillectomy years ago has led to a situation in which children with SDB, who later developed OSA during adulthood, were never treated for the relevant condition. For these patients, treatments like Continuous Positive Airway Pressure may not be indicated. Hence, family physicians must repeatedly ask patients and friends about loud snoring, gaps in their breath, and excessive daytime sleepiness, especially soon after puberty and early adulthood, and advise them to ask for a polysomnography if positive results are observed. Treatments for mild cases and early stages of SDB that help weight loss and reduce exposure to lung irritants are appropriate. Family physicians can also take the lead in referring patients to visit dentists. Early treatment of poor oral health factors, such as the fitting of prosthetic oral devices, may prevent the worsening of SDB. It is hoped that these simple methods would ultimately result in earlier intervention and improve oral health and general well-being.

6.2. Oral Appliances

Treatment of sleep-disordered breathing (snoring and obstructive sleep apnea) can be divided into four general categories: treatment modalities that (1) modify lifestyle, (2) surgically modify the anatomy of the upper airway, (3) change the shape and size of the upper airway with oral appliances, and (4) those that create a pneumatic splint that stents open the airway. The treatment of sleep-disordered breathing by dental devices falls within the scope of practice of the dental profession. Three separate categories of appliances are recognized: (1) oral appliances, (2) surgery for mandibular repositioning, and (3) palatal lift prostheses. Oral appliances (mandibular advancement devices (MAD)) retain the mandible in an advanced position, which in turn moves the tongue and other structures holding the upper airway patency.

Compared with continuous positive airway pressure (CPAP) treatment in which a pnea/hypopnea index of <10/hour of sleep is achieved in 99% of patients, MAD produces a favorable result (AHI < 10/hour) in 65% of patients. Oral appliances are an alternative to CPAP for the treatment of the obstructive sleep apnea and snoring. Oral appliances produce favorable results for

a majority of patients within a short time and are much less invasive than surgery (Hoffstein, 2007). Despite the great strides and the convincing evidence pointing to their efficacy, oral appliances for the treatment of the obstructive sleep apnea are still underutilized. Many physicians and dentists are unaware of their potential, and generally dentists are not educated in this type of therapy. A self-administered questionnaire was used. The knowledge about oral appliances for the treatment of snoring and obstructive sleep apnea among dentists and physicians varies geographically. It is greater in large urban centers than in the outskirts, and dentists hold more knowledge in this area compared to physicians.

6.3. CPAP Therapy

Continuous positive airway pressure (CPAP) is a device that can be used to manage OSA. It works by delivering a continuous fixed pressure into the upper airway via a tight-fitting mask worn over the nose (nasal) or mouth and nose (facial) during sleep. This pressure acts in order to overcome the collapse of the airway during sleep, maintaining its patency and permitting the patient to continue sleeping without disruptions to normal breathing (Athauda Arachchige & Steier, 2022). Although successful in controlling airway patency when asleep, many patients find utilizing it during the night uncomfortable and long-term adherence remains problematic. Studies indicate that CPAP adherence rates are not constant among patients with OSA and differ significantly. They generally seem to range from 30 to 60%, suggesting that up to 70% of those prescribed CPAP therapy abandon it in the long-term. The failure of patients to adhere to treatment regimens has been a severe problem in health care in general. Treatment adherence should, therefore, be an important goal in of itself, as well as a potential mean for maximizing treatment efficacy. The occasional user effect concerns reports that untreated OSA patients present worse subjective sleep quality than those under CPAP therapy do on self-reported questionnaires; whereas on the same questionnaires, CPAP users' scores are not significantly different to those of healthy subjects. These findings suggested that subjects utilizing CPAP, even poorly (average use < 4 h/night), could falsely feel sleepier. A study on the effect of CPAP therapy in severe OSA patients on a simple mathematical task indicated that using CPAP stopped the neurocognitive parameter decline expected from healthy ageing, a decline found in patients not using CPAP. Nonetheless, the actual use of CPAP played no role in changing the neurocognitive performance, except when adherence was < 2 h. It is, therefore, possible that controlled research on more complicated or different will uncover different results.

7. Case Studies and Clinical Examples

Sleep disorders have been increasingly recognized as a public health concern because of their significant prevalence and their intimate association with a wide variety of conditions, such as sleep deprivation, human immunodeficiency virus infection, psychiatric conditions (anxiety, mood and substance abuse), use of medications (antidepressants or methamphetamines), and occasional abnormal conditions (obstructive sleep apnea, restless legs syndrome). Sleep disorders are associated with substantial secondary social morbidity and individually there is a strong link between sleep disorders and a wide range of co-morbid conditions. Physicians and specialists who deal with conditions that are linked to sleep disorders have a heightened awareness of the potentially multifactorial basis of hypersomnia and insomnia. In contrast, patients may seek care of their own volition or may seek care from family physicians and nurses who are more broadly focused or not fully familiar with the myriad presentations of sleep disorders. For this reason, it is important that prospective educators, clinicians, and researchers, including family doctors and other primary health professionals, are aware of the impact of sleep deprivation.

Patient problems with respect to sleep time can bring people to the clinic. In such cases, sleep education, counseling, or therapy may be needed. Nurses and other primary care providers occupy a pivotal position in influencing sleep hygiene and other health behaviors. They may be tasked with administering medications and advising relevant professionals. These professionals need to understand the impact of sleep in order to help patients with these biological problems. Since it is known that without such support, many can never gain access to somnological expertise. At a recent educational session, 11 of the 69 consultants there were instructed on the impact of clinical problems on sleep without being able to mention specific definitions or diagnoses (J Jaiswal et al., 2017).

8. Patient Education and Counseling

Dentists and other health professionals can play a major role in identifying and managing sleep disorders. Therefore, it is important that they are knowledgeable about sleep disorders, their impact on oral health and the treatments for their management. A wide spectrum of oral health problems can result from numerous sleep disorders. Oral health professionals are frequently the first people to be in contact with individuals exhibiting disrupted sleep patterns or the signs of sleep-disordered breathing. However, the association of sleep disorders with oral health has not been sufficiently appreciated.

Practitioners would like to work very closely with a sleep physician while treating the patient. They would like to work in collaboration with a sleep physician even if they notice a patient presenting with a severe situation. Dental graduates were mostly choosing “close observation” because they were uncertain about what oral signs and symptoms to look for. Graduates chose not to do anything specific because they believed that OSA was not their field of work. Oral surgeons had the most knowledge about OSA (Chauhan et al., 2024). The Group Practice Dental Control Regulations in Hong Kong were enacted in January 2000 and are not implemented yet. OSA, an under-addressed medical field, is a potentially catastrophic medical condition. It is concerning to note the gaps in knowledge concerning OSA in participants and that most believe that it was not their responsibility to address OSA. A timely referral to a sleep physician by the dentist when necessary can improve the patient’s quality of life. In this regard, a close collaboration between medical doctors and dentists are essential. It indicates that OSA educational programs in dental and medical schools need to be improved. With the expected increase in the number of dental and medical graduates, early identification and treatment of OSA in dental clinics will be beneficial for the Hong Kong community. Between 70 to 80% of Hong Kong’s population visit a dental practitioner annually. Additively, the population-to-dentist ratio in Hong Kong is between 1,685 to 1,939 and dentist-to-practice ratio is between 1.1 to 1.3 that is ideal for practicing OSA evaluation.

8.1. Promoting Good Sleep Hygiene

Promoting good sleep hygiene can help a patient achieve better quality sleep. This measure requires not only an educated patient but CME-compliant physicians and nurses to promote good sleep practices and “prescribe” relaxation methods. Examples of potential successful strategies are highlighted in this paper. Raising awareness about sleep disorders and promoting sleep hygiene in busy clinical settings and in developing countries where many patients with sleep disorders remain undiagnosed or their sleep disorders remain misunderstood by clinicians present a number of challenges. Clinicians throughout the world frequently recommend their patients “get a good night’s sleep,” but rarely focus on sleep issues beyond this generic and vague directive in their busy clinical settings. Indeed, a survey of primary care clinicians completed by found that two-thirds of clinicians never inquired about their patients’ quality or quantity of sleep. Conversely, whereas 44.7% of US adult patients report sleep problems, a mere 4.16% of visits result in a sleep disorder diagnosis (with 36% of diagnoses placing at least 12 months after symptoms onset). This comports with findings derived from , which revealed that general and family practice physicians are confronted with sleep complaints by patients in only 1.25% of all visits, ranking sleep problems twentieth among complaints offered to clinicians (J Jaiswal et al., 2017).

8.2. Oral Health Care Tips for Patients with Sleep Disorders

1. Patients with sleep disorders are advised to adhere to strict oral hygiene practices, visiting their dentist and physician every 6 months, reducing high sucrose in their bedtime snacks, and controlling their consumption of energy drinks. Patients with sleep disorders are encouraged to use a mouthguard during sleep and consult their healthcare provider if they experience jaw pain, muscle aches, or headaches. Furthermore, patients with sleep disorders who use a continuous positive airway pressure (CPAP) machine are advised to clean the mask, tubing, and humidifier frequently, as such machines are a recognized source of potential oral infection. Such patients are also encouraged to wear a chin strap, visit their dentist every 6 months, adhere to strict oral hygiene practices, make a custom-made intraoral device for temporary use, and specifically ask for a CPAP-compatible machine. Although the observed link between sleep duration and dental caries was not conclusive in a nationally representative population, several oral health care recommendations for patients with sleep disorders were provided (Alawady et al., 2023).

2. Undiagnosed and untreated sleep-disordered breathing (SDB) generates additional health risks in addition to the increases in caries and periodontal disease. Affecting health care specialists, it is crucial to plan for adequate dental care. Dental professionals acknowledge the importance of sleep regularity for oral health. However, it was found that dentists’ awareness declines as their education of sleep medicine grows. Therefore, further study is required to understand the necessity of enhancing the teaching of sleep disorders in the dental medicine curriculum (J Jaiswal et al., 2017).

9. Research and Future Directions

The implications on oral health from a variety of sleep disorders, compounded by the exacerbation of oral health due to a lack of or insufficient sleep, range from potentially damaging to fatal. Since family physicians, dentists, and nurses are the standard healthcare providers seen for regular check-ups, the oral health complications from sleep disorders should be regularly addressed by all healthcare providers regardless of specialty. A tightening of the overall holistic approach to patient care might provide early recognition and mitigation of potential oral health issues.

Family physicians are typically the first healthcare providers seen for any variety of health issues. Depending on the doctor and the situation, sleep apnea might be first recognized as an issue in a family physician's office. Dentists are the next most-frequently-visited healthcare provider, and are in a unique position when it comes to oral issues. The discomfort caused by a sleep disorder may lead a patient to complain to his dentist, who may be the one to recommend that he see a family physician. Nurses are in the next tier of frequently-visited healthcare providers, seeing patients less frequently than physicians, dentists, or specialists (J Jaiswal et al., 2017). However, as they often rotate through the different wards and departments, nurses might recognize issues caused or worsened by a lack of sleep or disrupted sleep that other healthcare providers do not, and thereby recommend the patient seek further help for these issues.

9.1. Current Research Findings

The purpose of this study was to evaluate the association between insufficient sleep and dental caries in preschoolers. The sample was collected from 30 private kindergartens and nurseries in Japan. Infant's sleep and dental health conditions were evaluated by a questionnaire survey. The Japanese version of the BEARS Sleep Questionnaire (BEARS-J) was used. Components of the BEARS-J are: bedtime problems, excessive daytime sleepiness, awakening during the night, regularity and duration of sleep problems, and snoring. Parents were asked to answer the BEARS-J Sleep Questionnaire based on their children's conditions. Parents of the children were asked about the number of times their children consumed sweet drinks before bedtime and infant formula milk at night, their hygiene conditions before bedtime, the number of dental check-ups and instructions, and the occurrence of dental caries. Additionally, parents were asked about their sleep conditions using the Japanese version of the Epworth Sleepiness Scale and Insomnia Severity Index. Parent's sleepiness and insomnia were divided into 3 levels, and an estimated score of 10 or more was judged as unfavorable. To examine the association between insufficient sleep and dental caries in children, the average duration of night-time sleep was calculated based on variations among individuals. An extra 1 h of sleep or an insufficient sleep if the child's duration of night-time sleep was below their average calculated value was defined. Possible explanatory variables were infant's age, birth order, sex, frequencies of consuming sweet drinks before bedtime or infant formula at night, relationship of the ANDI sleep score of the children and mothers.

9.2. Areas for Further Study

While substantial research has been conducted examining the contributions to and effects on health by an individual's sleep, specifically obstructive sleep apnea (OSA) and its related co-morbidities, there is little attention given to interactions with oral health providers. This pilot study will evaluate the knowledge of sleep disorders from family physicians, dentists and dental hygienists; and investigate their practices, both in clinical efforts and routine evaluation and treatment intake. Following informed consent and Health Insurance Portability and Accountability Act (HIPAA) forms, a brief paper questionnaire will be administered to family physicians, dentists, and dental hygienists in a local region.

One concern is the likelihood of dependent respondents within the same practice, however, the hypothesis of interest is most pertinent to primary care and dental health professionals. Inclusion criteria are outlined in Table 1 in portion C for the respective professionals. Utilizing a matched sample of general practitioners aims to eliminate concerns regarding differential training in medical school between specialties. Additionally, the use of frequency analysis capturing both attitudes and practices seeks to address previous works' failures at doing so (Chauhan et al., 2024). Collecting the data in person nearly eliminates missing or incomplete data, while also conducting a statistical analysis to identify improbable likelihood responses. It should be noted that the retrospective questions concerning proper diagnosis will prompt responses as generally as possible that could account for this practice not previously being offered. However, this also provides a comprehensive examination of general knowledge and practices contingent on this belief. Overlapping questions were intended to either validate responses or measure consistency within responses. Conclusively, an effort was made to prove the uniqueness and effectiveness of this pilot study design.

10. Conclusion

Sleep duration is a biopsychological phenomenon and complex behavior. On an average, an adult requires eight hours of sleep per day, which forms one-third of an individual's life. Adequate sleep is one of the most important factors for the safety and maintenance of life, after water and food (Alawady et al., 2023). In today's era, sleep disorders are increasingly being diagnosed all over the world. Sleep disorders have been closely related to general and oral health, behavioural and psychiatric disorders.

Sleep is influenced by stock market, economy, workplace conditions, housing conditions and nutritional status. There are a number of people who struggle with sleep disorders that are particularly difficult to treat. Management of sleep disorders generally involves encouragement of behavioural changes in sleep hygiene, weight control, avoidance of sleep-inducing drugs, exercise, bright light therapy, artificial positive airway pressure masks, behaviourally oriented methods, and digital and electronic devices. People who experience sleep disorders are often impatient and may not comply with treatment. Because sleep disturbance is difficult to measure, most clinicians may settle for medication, sedatives or analgesics that have a transient effect. It may be the presence of oral fungal, bacterial, and viral pathogens due to the decrease in saliva production during the sleep cycle that can trigger diseases such as halitosis, xerostomia or candidiasis. In addition, gastro-oesophageal reflux, a possible cause of dental erosion, is more likely to occur during exercise, and lung-related diseases can also be seen as a result of reduced saturation of oxygen in the blood. Family physicians, as well as dentists and nurses, can and should play a role in early diagnosis and prevention of sleep disorder-related diseases and oral diseases.

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