“A New Screening Tool Connects Comorbidities to Sleep Disordered Breathing”

References for the Lamberg Questionnaire: LQ 2.1

Category 1: (the most commonly asked screening questions)

- “STOPBANG” questionnaire: Snoring, Tired, Observed apneas, Pressure (BP), BMI, Age, Neck circumference, Gender) Berlin Questionnaire, ESS.

- Physical: BMI, Sex, Age >50, Neck Size, Tonsil Grade, Oral Pharyngeal Crowding, Tongue level, Hyoid position, Craniofacial characteristics, Orthodontic type, Palatal vaulting, Family History of SDB.

  • Have you had unexpected weight changes recently?
  • Have you ever had a PSG? Titration study? Home sleep test?
  • Do you snore loudly enough at night to cause conflict with others?
  • Have you been told you have stopped breathing at night?
  • Did you ever wake up choking?
  • Do you awaken unrefreshed?
  • Do you have morning headaches?
  • Do you feel sleepy during the day? ESS. (Use Caffeine or Prescription Stimulants)
  • Do you feel fatigued during the day?
  • Do you have difficulty breathing through your nose? (Post nasal drip, or dry mouth in morning?)
Category 2: Cardiovascular:

SDB predicts an increased prevalence of CAD, Stroke, Arrhythmias, Hypertension. Endothelial Dysfunction.

1) Young T; Finn L; Peppard PE; Szklo-Coxe M; Austin D; Nieto FJ; Stubbs R; Hla KM. Sleep disordered breathing and mortality: eighteen-year follow-up of the Wisconsin Sleep Cohort. SLEEP 2008;31(8):1071–1078.


SDB in CAD patients is twice that of non-CAD patients. An AHI>10/h has been shown in 37% of the patients with CAD.


Patients with OSA have higher risk of CAD and need aggressive prevention.

Gami AS et. al., Chest 1/2007, 131:118-121

Meta-analysis showed greater likelihood of stroke or CV events with increasing AHI.

Loke, YK MD, et. al. Circ Cardiovasc Qual Outcomes. 8/2012;5:00-00

Increase in free radicals (oxidative stress), homocysteine and decrease in nitric oxide leads to damaged endothelium and loss of vessel elasticity, resulting in hypertension.


OSA is an independent risk factor for development of hypertension and this relationship is dose-dependent.


Within OSA population, 50% are hypertensive and within Hypertensive population, 30% have OSA.


OSA patients have an impairment of resistance-vessel endothelium-dependent vasodilation.(Endothelial Dysfunction) This may be implicated in the pathogenesis of hypertension and heart failure in this condition.

**Drug Resistant Hypertension, prevalence of OSA:** 96% men, 65% women.


Hypertensive patients, especially those whose 24 h BP studies that yielded non-dipping, should be screened for occult OSA as a cause of secondary hypertension.


If ambulatory blood pressure monitoring indicates that a patient is a “non-dipper”, the chances that the patient has OSA are increased.


In patients who are “non-dipping”, the prevalence OSA was 84%.


38,000 CV deaths/year linked to OSA National Commission on Sleep Disorders Research

Stroke OR is 3x if AHI>30


Heart Failure patients: 12%-53% have OSA


Presence of OSA was associated with increased odds of having HF.


Severe OSA patients OR=5.2 for CV mortality

Young T; Finn L; Peppard PE; Szko-Coxe M; Austin D; Nieto FJ; Stubbs R; Hla KM. Sleep disordered breathing and mortality: eighteen-year follow-up of the Wisconsin sleep cohort. SLEEP 2008;31(8):1071-1078
Within Angina Population (including acute coronary syndrome “ACS”), 30% to 69% had OSA.


Moderate-Severe OSA was independently associated with Angina (odds ratio 9.61)

60% of patients with severe OSA were found to develop cardiac arrhythmias.

Nocturnal Arrhythmias occur in 50% of OSA patients

68% of patients with atrioventricular block have OSA

Ventricular Arrhythmias in 66% of OSA patients (PVCs)

In AFib cohort studies: 42% to 45% to 81% have OSA

In Severe OSA cohort, risk of AFib is increased 4x
Patients with AFib may benefit from screening for OSA because OSA is a treatable risk factor for the initiation and recurrence of AFib after ablation.


In Pacemaker patients, 59% have OSA.

Snoring may be a CV Risk Factor. CIMT was significantly thickened compared to healthy non-snorers. Snoring posed a greater risk for abnormal CIMT than smoking obesity, and high cholesterol.


Patients with OSA appear to have increased dyslipidemia (high total cholesterol, LDL, TG, and low HDL) Sixty-four studies were pooled for analysis; since some studies have more than one dataset, there were 107 datasets with 18,116 patients pooled for meta-analysis.


Insulin resistance Increases Arterial Inflammation


The risk of having clogged coronary arteries (the precursor of a heart attack) is more than doubled for people with vitamin D deficiency (less than 20 ng/mL).


Patients with hypertension who sleep less than five hours or more than eight hours each night may have significantly higher odds of a stroke, new research suggests. Analyzing data from 203,794 U.S. residents with hypertension, scientists determined that "insufficient" sleepers
logging less than five hours of sleep each night had an 83 percent increased risk of stroke compared to "healthy" sleepers who got seven to eight hours of sleep. "Long" sleepers reporting more than eight hours of nightly sleep experienced a 74 percent higher stroke risk than healthy sleepers, according to the study. Data collected over nine years from the U.S. National Health Interview Survey of 203,794 Americans with hypertension. Overall, the stroke risk was nearly 13.6 percent among "long" sleepers; 11.2 percent among "insufficient" sleepers; 5.7 percent for "short sleepers" logging five to six hours per night; and about 5.4 percent among "healthy" sleepers.

Oluwaseun Akinseye, M.D., a resident in internal medicine at the Icahn School of Medicine of Mount Sinai Hospital in New York City, Presented at the annual meeting of the American Society of Hypertension, May 15, 2015, in New York City.

Category 3: Pulmonary:

In OSA population, 10%-20% have COPD


COPD with OSA = “Overlap Syndrome” increased mortality
Jose M. Marin, Joan B. Soriano, Santiago J. Carrizo, Ana Boldova, and Bartolome R. Celli
“Outcomes in Patients with Chronic Obstructive Pulmonary Disease and Obstructive Sleep Apnea”, American Journal of Respiratory and Critical Care Medicine, Vol. 182, No. 3 (2010), pp. 325-331.

Greater than 10% chance of OSA in COPD pop and vice versa. When seeing a patient with either OSA or COPD, it is reasonable to screen for the other.

OSA increases BP of Pulmonary Artery leads to Pulmonary Hypertension and possibly COPD.

1) Trenton D. Nauser, M.D., and Steven W. Stites, M.D., Diagnosis and Treatment of Pulmonary Hypertension, Am Fam Physician. 2001 May 1;63(9):1789-1799.

COPD causes Nocturnal Oxygen Desats, impairs sleep.
E C Fletcher; J Miller; G W Divine; J G Fletcher; T Miller, Nocturnal oxyhemoglobin desaturation in COPD patients with arterial oxygen tensions above 60 mm Hg., Chest. 1987;92(4):604-608.

11% to 20% of those with controlled asthma reported sleep disturbances.

OSA patients have OR of 2.87 for asthma
Asthma cohort has 72% inc. risk for developing OSA, each disorder making the other worse.


In Asthma cohort, 30%-90% have Rhinitis


Category 4: Gastroenterology:

In Western countries, GERD symptoms, such as heartburn and acid regurgitation, occur in about 20% of adults weekly and in about 7% of adults daily.


While the airway obstruction is superior to the junction of the larynx and the esophagus, each “event” will cause increased negative pressure in the esophagus. Pressure gradient across the LES may create aspirations of stomach contents.


In Nocturnal GERD pop, Odds Ratio of having OSA is 2.97.

You, Chan Ran; Oh, Jung Hwan; Seo, Minji; Lee, Hye Yeon; Joo, Hyonsoo; Jung, Sung Hoon; Lee, Sang Haak; Choi, Myung-Gyu, Association Between Non-erosive Reflux Disease and High Risk of Obstructive Sleep Apnea in Korean Population, PMC 2014-01-01.

Nocturnal reflux symptoms was increased in OSA patients to (10.2%) versus the general population (5.5%) and is 3 times as likely in severe OSA compared with Mild OSA. Prevalence of nocturnal reflux symptoms is increased in those with or suspected of having OSA.


A study of 16 patients with both OSA and GERD found that improving their breathing mechanics with continuous positive airway pressure (CPAP) normalized the esophageal acid exposure in 81%.
Prevalence of GERD was significantly increased in those with primary snoring and OSAS compared to the general population.

Morbid Consequences of GERD include: changes of cells lining the lower esophagus. About 10% of people with chronic symptoms of GERD develop Barrett's esophagus which is a precursor to esophageal adenocarcinoma, a serious and potentially fatal cancer.

In GERD cohort, TMJ disorders are twice as prevalent.

Patients with GERD have a significantly higher risk of concurrent asthma compared with patients without GERD.

Less than six hours and more than nine hours of sleep per day are each associated with an increased risk of ulcerative colitis.

13% of patients with IBD had OSA

Category 5: Neurology:

Neurological disorders with primary neurological symptoms are improved by treatment of comorbid OSA include: dementia, stroke, epilepsy and headache.


Intermittent hypoxia in OSA is an independent risk factor for axonal damage of peripheral nerves.


Strong association between OSA and peripheral neuropathy and sight-threatening retinopathy.


60% of patients with diabetes and OSA also have a peripheral neuropathy, which is partly reversible with treatment for sleep apnea.


Neuropathy prevalence was higher in patients with OSA than those without" (60% vs 27%) … OSA remained independently associated with diabetic neuropathy (odds ratio, 2.82)


In patients with neuromuscular disorders, 42% have OSA.


30%-70% Alzheimer’s patients have SDB


Prevalence of OSA in patients with dementia has been estimated to be 70%-80%.


20% Parkinson’s patients have OSA


Within OSA patients, OR of developing Glaucoma within 5 years is 1.67

AAOJ, Obstructive Sleep Apnea and Increased Risk of Glaucoma. A Population-Based Matched-Cohort Study Ching-Chun Lin, MA, Chao-Chien Hu, MD, Jau-Der Ho, MD, PhD, Hung-Wen Chiu, PhD, Herng-Ching Lin, PhD Published Online: April 17, 2013.

OSA treatment shown to reduce frequency of cluster headache. Patients with severe snoring and cluster headache should be evaluated for OSA.


Population-based studies using the full standard diagnostic criteria for RLS report a prevalence of 5% to 10%.


80%-90% of patients with RLS have PLMD
Aurora RN; Kristo DA; Bista SR; Rowley JA; Zak RS; Casey KR; Lamm CI; Tracy SL; Rosenberg RS. The treatment of restless legs syndrome and periodic limb movement disorder in adults—an update for 2012: practice parameters with an evidence-based systematic review and meta-analyses. SLEEP 2012;35(8):1039-1062.

40% of subjects with iron and B12 deficiency have RLS symptoms. Patients with symptoms of RLS should be tested for iron deficiency.

Hyperhidrosis (night sweating), May be related to excessive body movement.

OSAS should be considered as a significant risk factor for Normal-tension glaucoma (NTG). It is advisable to take an accurate sleep history (including questions about snoring, nocturnal gasping-choking, daytime sleepiness and morning headaches) from patients with NTG and refer these patients for PSG test.

Category 6: Endocrinology:

Prediabetes (pop >20 yrs old) 35%.

Within Type 2 Diabetes population, 36%-50% have OSA with AHI >15. (49 percent of male participants with an AHI > 15 have type 2 diabetes.)

Within Type 2 Diabetes population, 71% have OSA, in the average data from 5 studies including a total number of nearly 1200 type 2 diabetic patients:
What is the Prevalence of OSA in Type 2 Diabetics? Resnick et al., 2003; Einhorn et al., 2007; Foster et al., 2009; Laaban et al., 2009; Aronsohn et al., 2010, Frontiers in Neurology. 2012; 3: 126.

In diabetes cohort, the prevalence of OSA may be up to 23%.
In diabetes cohort, prevalence of some form of sleep disordered breathing may be as high as 58%.


In patients with diabetes, the prevalence of OSA range from 29% to 63% depending of the criteria adopted for OSA.


In OSA cohort, estimates suggest 40% have diabetes.


Optimal treatment of sleep apnea with continuous positive airway pressure (CPAP) for two weeks led to significant improvements in glucose levels following an oral glucose challenge without affecting insulin secretion, suggesting an improvement in insulin sensitivity. Treatment of sleep apnea in patients at risk for developing diabetes may lower this risk, and an assessment for sleep apnea may be appropriate as part of the clinical evaluation of patients with prediabetes.

Effective Treatment Of Obstructive Sleep Apnea Improves Glucose Tolerance In Prediabetes: A Randomized Placebo-, Sushmita Pamidi , MD, Magdalena Stepien , BSc , Khalid Sharif-Sidi , BSc , Harry Whitmore , RPSGT, Lisa Morselli , PhD, Kristen Wroblewski , MS , Esra Tasali , MD, Pamidi S. Abstract 39588. Presented at: American Thoracic Society 2013 International Conference; May 17-22, 2013; Philadelphia

Menopause: Decrease in Estrogen and Progesterone leads to weight gain and decrease muscle tone which increases SDB. HRT may help.


Within obese population, prevalence of OSA 70%.


Within OSA pop, 70% are obese, so 30% aren’t obese.


24% of the general population has Metabolic Syndrome , a cluster of conditions ( increased blood pressure, a high blood sugar level, excess body fat around the waist,
and abnormal cholesterol levels) that, when occurring in combination, increase your risk of heart disease, stroke and diabetes.


In Metabolic Syndrome cohort, OR for MI is 2.63 compared with normal

In Metabolic Syndrome Cohort, prevalence of mod-severe OSA is 60%

In OSA population, 60% have Metabolic Syndrome.

In patients with OSA, prevalence of metabolic syndrome is 40% greater.
Metabolic Syndrome + OSA= Syndrome Z

Narcolepsy is result of reduction of Hypocretin (orexin) and can be accompanied by:
Cataplexy, Hypnogogic Hallucinations, Sleep Paralysis (SP), and Sudden Onset REM Sleep (SOREMS).
Mona Skard Heier, MD, PhD, Tatiana Evsiukova, MD, Steinar Vilming, MD, PhD, Michaela D. Gjerstad, MD, Harald Schrader, MD, PhD, and Kaare Gautvik, MD, PhD. CSF Hypocretin-1 Levels and Clinical Profiles in Narcolepsy and Idiopathic CNS Hypersomnia in Norway. Sleep. Aug 1, 2007; 30(8): 969–973.

Incidence of osteoporosis was 2.7 times higher among patients with sleep apnea than their counterparts.

75 percent of the participants who had gestational diabetes also suffered from obstructive sleep apnea.

Sleep Fragmentation and Deprivation leads to: activation of Hypothalamic Pituitary Adrenal axis and Sympathetic NS stimulation, and increased cortisol release.

Less than 6 hours sleep increases risk of Pre-diabetes 4.7 times.
Lisa Rafalson, PhD. presented at the AHA epidemiology and Prevention Meeting, April 2009.
Sleep duration and quality have emerged as predictors of levels of Hemoglobin A1c, an important marker of blood sugar control. Recent research suggests that optimizing sleep duration and quality may be important means of improving blood sugar control in persons with Type 2 diabetes.


Patients with severe OSAS had significantly lower levels of 25(OH)D, vitamin D, as compared with other groups. When the severity of OSAS increases, 25(OH)D deficiency becomes more pronounced. (This study shows association only, not causality.)


If you have normal blood sugar today, a vitamin D deficiency makes you 91% more likely to progress to insulin resistance, or "pre-diabetes," and it more than doubles your risk for progressing to active, type II diabetes.


In a study of 50 patients with primary hypothyroidism, OSA (AHI ≥5) was present in 15 patients (30%) at baseline and was reversible in 10 of the 12 patients evaluated following thyroxine replacement therapy (P=0.006). Thyroixine replacement therapy was associated with improvement in findings that reflect a compromised upper airway, such as macroglossia (4 [33%] vs. 1 [8%; P=0.083), myoedema (5 [42%] vs. 1 [8%]; P=0.046) and facial puffiness (10 [83%] vs. 1 [8%]; P=0.003). Reversible SDB is common among patients with primary hypothyroidism. Changes in upper airway anatomy resulting from hypothyroidism probably contribute to the development of SDB in these patients.


Category 7: Otolaryngology:

Nasal congestion patients are 2x as likely to have OSA.

Diseases and Conditions, Obstructive Sleep Apnea, Risk Factors, Mayo Clinic, Mayo Clinic Staff, June 15, 2013.

Patients with nasal congestion are 1.8 times more likely to have moderate to severe OSA compared to those without symptomatic congestion.

1) Gupta N, Goel N, Kumar R. Correlation of exhaled nitric oxide, nasal nitric oxie and atopic status; cross-sectional study in bronchial asthma and allergic rhinitis. Lung India. 2014; 31(4): 342-347.


Nasal obstruction associated with congestion represents a risk factor for respiratory sleep disordered breathing, including snoring, increase of the number of microarousals, episodes of hypopnea, and apnea.


Nasal Inflammation and sinus problems can result from OSA: Post nasal drip, sinusitis, nasal resistance, rhinitis, deviated septum, dry mouth upon awakening.


Nasal congestion is independently associated with snoring frequency.

Nasal congestion is a recognized risk factor for OSA

Allergic rhinitis increases risk of asthma 3x.

Otological Symptoms 85% in TMD population (tinnitus 42%, ear pain 42%, dizziness 23% and diminished hearing 18%)

Category 8: Urology:

In OSA population, reduced bioavailability of endothelia by derived nitric oxide and altered endothelially mediated vasodilation.

Various studies report between 40% and 64.4% of OSA patients have Erectile Dysfunction “ED”

Within ED population, 40% have OSA

Within ED population, 44% had OSA

NO has a role in erectile function and dysfunction. It was recognized as the key mediator of smooth-muscle relaxation in the penis many years ago.

Reduction in circulating NO in OSA patients has been observed.
Ip MS, Lam B, Chan LY, et al., Circulating nitric oxide is suppressed in obstructive sleep apnoea and is reversed by nasal continuous positive airway pressure, Am J Respir Crit Care, 2000;162(6):2166–71.

With increased severity of OSA, there is also increased occurrence of: overactive bladder, urgency incontinence.

Sleep Fragmentation and sympathetic activation from SDB causes inhibition of and decrease in circulating antidiuretic hormone “ADH” which may cause Nocturia or Enuresis. (ADH normally prevents urination at night.)

OSA should be considered whenever a patient reports frequent awakenings from sleep to urinate, even when the symptom was previously attributed to the presence of BPH.
Howard Tandeter, MD, Sammy Gendler, Jacob Drether, MD, MPH and Ariel Tarasiuk, PhD., Nocturic Episodes in Patients with Benign Prostatic Enlargement May Suggest the Presence of Obstructive Sleep Apnea, J Am Board Fam Med March-April 2011 vol. 24 no. 2 146-151.

Nocturia was independently associated with SDB (measured as Apnea Hypopnea index >15 per hour; OR 1.3) Results support sleep screening for SDB in patients with nocturia, Parthasarathy S1, Fitzgerald M, Goodwin JL, Unruh M, Guerra S, Quan SF.Nocturia, Sleep-Disordered Breathing, and Cardiovascular Morbidity in a Community-Based Cohort.PLoS One. 2012; 7(2): e30969.
Nocturia appears comparable to snoring as a screening tool for OSA.

The overall adjusted HR for BPH was 2.35 fold higher in the patients with SA than in the control patients. The patients aged between 51 and 65 had an adjusted HR of 5.59 for BPH in the SA patients compared with the control patients.

Short-term use of CPAP ameliorates globular hyper filtration in patients with OSA.

Category 9: Bruxism and TMD:

Sleep Bruxism “SB” reported in 8% of general population

OSA has highest risk factor for SB (OR of 1.8). Approx. twice general pop.

Most RMMA episodes (75%–88%) occur in association with sleep arousals.

Within adult SB population, 30%-50% of adult patients suffer from headaches.

Within all age SB population, 65 percent of patients report frequent headaches.

Within children with SB have OR for headaches of 4.3
Within SB population, prevalence of OSA is 4X that of general population so bruxers should be examined for presence of OSA.


Within OSA population, 25% have SB.

American College of Chest Physicians, Teeth Grinding Linked To Sleep Apnea; Bruxism Prevalent In Caucasians With Sleep Disorders, Science Daily, November 5, 2009.

In general population, 12% have TMD.


In OSA population, 52% have TMD. (Of these, 75% had chronic pain)


In TMD population, 65% reported Sleep Bruxism “SB” upon questioning.


60% of TMD pain patients and 37% of Sleep Bruxism patients report sleep disturbances.


In TMD population, 28%-32% have OSA.


Within a TMD population, 42% of reported tinnitus, 18% dizziness


In TMD population up to 85% have Otological Symptoms as compared to 10%-31% In general population.


Category 10: Psychology and Psychiatry:
Between 10%-15% general population have chronic insomnia.

Within OSA population, 39%-58% have insomnia symptoms, and Within insomnia population, 29% and 67% have OSA (OSA concurrent with Insomnia is called “SDB+”)

In SDB cohort, 50% have some type of insomnia.

Significant association between the psychiatric disorders (specifically depression) and sleep apnea.

In Depressive Cohort 20% have OSA, and in OSA Cohort, 20% have Depression.

Within the psychiatric outpatient population the prevalence of OSA is increased.

Within OSA population, the prevalence of Psychiatric comorbid conditions are increased.
In OSA cohort, 21.8% have Depression, as compared to 9% in the general population.
Amir Sharafkhaneh, MD; Nilgun Giray, MD; Peter Richardson, PhD; Terry Young, PhD; Max Hirshkowitz, PhD, Association of Psychiatric Disorders and Sleep Apnea in a Large Cohort, SLEEP, Vol. 28, No. 11, 2005.

Subjects with moderate or worse OSA had a 2.6 increase in odds of developing depression. This study further clarified the significant association between OSA and depression.

In OSA cohort, 11.9% have experienced PTSD, as compared to 3.9% in general population.
Amir Sharafkhaneh, MD1,3; Nilgun Giray, MD2,3; Peter Richardson, PhD1; Terry Young, PhD4; Max Hirshkowitz, PhD1-3,Association of Psychiatric Disorders and Sleep Apnea in a Large Cohort,SLEEP, Vol. 28, No. 11, 2005.
In OSA cohort, 5.1% experience Psychosis, significantly greater than seen in non-OSA.

Amir Sharafkhaneh, MD1,3; Nilgun Giray, MD2,3; Peter Richardson, PhD1; Terry Young, PhD4; Max Hirshkowitz, PhD1-3, Association of Psychiatric Disorders and Sleep Apnea in a Large Cohort, SLEEP, Vol. 28, No. 11, 2005.

SDB causes increases in: Cognitive Impairment, Mood Swings, ADHD, Difficulty Concentrating, and Circadian Rhythm Disorder in various populations.


Depression is reported at a prevalence of 1.8%–3.3% in community-based studies of the general population, but in patients with a sleep disorder, the prevalence of depression has been reported to be 17.6%. In patients with OSA in particular, its prevalence increases to 20% to 40%.


Progression of OSA has been found to be associated with an increased risk of developing depression. Even patients with mild OSA are 60% more likely to become depressed than individuals without this sleep disorder.


Many anxiolytic medications affect sleep architecture. Benzodiazepines reduce muscle tone, compromise airway patency, reduce REM sleep, suppress arousal response.


Category 11: Rheumatology:

Sleep abnormalities have been recognized in a number of different rheumatic diseases, including RA, OA, FM, JIA, SS, SLE, scleroderma, SpAs, sarcoidosis and Behçet’s syndrome.


Patients with rheumatic disorders (particularly RA) may be at increased risk for sleep
disorders, particularly OSA.


Co-existing sleep apnea may contribute to increased pain and fatigue, as well as increased cardiovascular morbidity/mortality, in patients with inflammatory rheumatological disorders.


Cohort with Gout had an OR of 2.10 of having OSA, compared with controls.


Oxygen desaturation in SDB may be associated with subsequent activation of inflammatory pathways, elevating serum uric acid levels.


Uric acid crystallizes in the form of monosodium urate, precipitate in joints, on tendons, and in the surrounding tissues.


Acidosis, (associated with hypoxia) is one factor that triggers MSU crystals to precipitate.


Not previously described is that joint diseases such as arthrosis and gout show a high occurrence in OSA. It is known that intermittent hypoxia during the sleep period increases purine catabolic products of adenosine and uric acid, which may be causative in the arthritic sequelae in OSA.


Braghiroli et al. showed high levels of uric acid in OSA patients and this level was restored by continuous positive airway pressure therapy.

Braghiroli A SC, Erbetta M, Ruga V, Donner CF. Overnight urinary uric acid: creatinine ratio for detection of sleep hypoxemia. Validation study in chronic obstructive pulmonary disease and

One-quarter to one-half of patients with obstructive sleep apnea syndrome have been shown to have hyperuricemia.


PSG data revealed OSA in 46.7% of RA (Rheumatoid Arthritis) patients.


More than half of patients with RA report sleep disturbance, a rate of prevalence that is 2–3 times greater than that found in the general population.


Co-existence of OSA in RA patients may influence the disease activity and the level of circulating inflammatory markers. Diagnosis and treatment of OSA in RA patients may help in improved clinical care, better prognosis and avoid rheumatoid-associated morbidities.


17% of Sarcoid patients were found to have sleep apnea, as compared with a control group at 3%.


Prevalence of sleep disturbance in Systemic Lupus Erythematosus (SLE) was 62%.


Category 12: Chronic Pain Patients:
Prevalence of Chronic pain ranges from 2% to 55%, depending on the criteria that the researchers set for their definition.


Chronic pain in elderly increased to 25%–50% and for nursing home residents as high as 70%.


44% of patients with chronic pain report insomnia versus 19% subjects without pain.


As many as 50%-88% patients with chronic pain report sleep disturbance.


Chronic Pain causes a decrease in Slow Wave Sleep.


Awakening headache occurs in 4% to 6% of the general population, 18% of insomniacs, and 15% to 74% of sleep apneics across studies.


24% of patients with OSA had frequent morning headache.


Within chronic headache population, 80% have OSA


OSA was diagnosed in 35%-57% of patients managed in long-term pain clinics.

Orofacial Pain reported in 66%-84% of patients with Sleep Bruxism.


SB patients have 4.3x headaches compared with control (7-17 yr olds).


In TMD population, 75% have chronic pain.


Chronic headache reported in 76% of treatment-seeking fibromyalgia patients.


In patients with fibromyalgia, complaints of poor sleep quality and fatigue are more prominent than pain.


Bidirectionality Theory: Pain causes poor sleep and poor sleep lowers pain threshold.

2) Christopher J. Lettieri, MD, The Association of Obstructive Sleep Apnea and Chronic Pain, Medscape Pulmonary Medicine, May 24, 2013.

Sleep abnormalities have been recognized in a number of different rheumatic diseases, including RA, OA, FM, JIA, SS, SLE, scleroderma, SpAs, sarcoidosis and Behçet’s syndrome.


Co-existence of sleep apnea in rheumatic disease patients may influence the severity of patient-reported symptoms of pain and fatigue, as well as potentially impacting on levels of circulating inflammatory markers and mediators.

**Category 13: Pediatrics:**

Prevalence OSAS in children is estimated to be 1-3%

Prevalence SDB is as high as 7%-25%

Prevalence of habitual snoring ranged from 3.2%-12.1% and in some reviews from 8%-27%.

SDB inhibits growth in 1-10% of children by decreasing Insulin Growth Factor.

Childhood onset asthma predicted development of OSA with OR of 2.1
Mihaela Teodorescu, MD, Asthma Tied to Sleep Apnea, medpage, May 21, 2013.

Chervin et al reported that 33% of children with ADHD were habitual snorers.

OR for neurobehavioral problems is 2.93

When AHI>10, LV mass index above the 95th percentile OR of 11.2

37% of children with OSAS had evidence of right ventricular dysfunction commensurate with elevated pulmonary artery pressure.

Changes in left ventricular wall thickness indicative of elevated afterload were found in a high proportion of children with OSAS, systemic blood pressure elevations.

Within “children with OSA” have frequent enuresis up to 7%-32%,

Within “children with OSA” have persistent snoring and difficulty breathing 96%-100%

Within “children with OSA” prevalence of mouth breathing is 84%

Mouth breathing has been associated with altered craniofacial growth, including narrow maxillary arch, posterior crossbite, long anterior face height with clockwise mandibular growth rotation, anterior open bite and mandibular retrognathia. SDB in children has been
associated with numerous systemic health consequences including reduced systemic growth, systemic hypertension, and pulmonary hypertension causing right and left ventricular hypertrophy, respectively, as well as behavioral problems such as hyperactivity and attention deficit, aggression, and lower grades in school. Additionally, if left untreated, the altered growth pattern increases the risk of adult OSA. All children should be carefully observed while sleeping and any breathing sounds made, or apparent struggles with breathing, must result in additional diagnostic steps.


Rapid maxillary expansion is an effective treatment option for children with OSA, particularly in cases of malocclusion and without significant adenotonsillar hypertrophy.


The Brouilette questionnaire is an excellent diagnostic questionnaire for OSAS in children with AT hypertrophy.


OSA incidence in kids w/ ADHD is 20-30% vs 1-4% in general population. A retrospective study.


Additional Recommended Reading:

AADSM Board Review Reading List.

Books:

Principles and Practice of Sleep Medicine, Kryger, Roth, and Dement, 4th and 5th Editions, Elsevier, were major resources.
Principles and Practice of Pediatric Sleep Medicine (second edition) Sheldon Ferber, Kryger, Gozal. 2014 Elsevier

Sleep Medicine for Dentists, A practical Overview, Gilles J. Lavigne, DMD, Peter A. Cistulli MBBS PhD, Michael T. Smith PhD., 2009 Quintessence Publishing Co Inc.

Sleep Disorders and Sleep Deprivation, An Unmet Public Health Problem, Harvey R. Colten and Bruce M. Altevogt Editors, Institute of Medicine, National Academies Press, Washington, DC, 2006

Sleep Disorders, Diagnosis, Management and treatment, A handbook for clinicians. Peretz Lavie, Fiora Pillar, Atul Malhotra, Martin Dunitz, 2002

Beat the Heart Attack Gene, "The Revolutionary Plan to Prevent Heart Disease, Stroke and Diabetes", Bradley Bale MD, Amy Doneen ARNP, Lisa Collier Cool. Wiley General Trade 2014