

SLEEP APNEA Facts and Figures

WHAT IS SLEEP-DISORDERED BREATHING (SDB)?

SDB describes a number of nocturnal breathing disorders

- Obstructive sleep apnea (OSA)
- Central sleep apnea (CSA)
- Nocturnal hypoventilation
- Chevne-Stokes respiration (CSR)

WHAT IS OBSTRUCTIVE SLEEP APNEA (OSA)?

- Most common form of SDB
- A partial or complete collapse of the upper airway that causes muscles controlling the soft palate and tongue to relax
- Person experiences apneas, hypopneas and flow limitation
 - Apnea: a cessation of airflow for ≥10 seconds
 - Hypopnea: a decrease in airflow lasting ≥10 seconds with a 30% oxygen reduction in airflow and with at least a 4% oxygen desaturation from baseline
 - Flow limitation: narrowing of the upper airway and an indication of an impeding upper airway closure



Partial Obstruction

Blocked Airway

Signs and Symptoms of Sleep Apnea

LACK OF ENERGY

MORNING HEADACHES

HYPERTENSION

FREQUENT NOCTURNAL URINATION

DEPRESSION

OBESITY

LARGE NECK SIZE

EXCESSIVE DAYTIME SLEEPINESS (EDS)

NIGHTTIME GASPING, CHOKING OR COUGHING

GASTROESOPHAGEAL REFLUX (GE REFLUX)

IRREGULAR BREATHING DURING SLEEP (IE, SNORING)

CLASSIFICATION OF SLEEP APNEA

AHI (Apnea-Hypopnea Index)

- Number of apneas and/or hypopneas per hour of sleep (or study time)
- Reflects the "severity" of sleep apnea

AHI = 0-4 Normal range

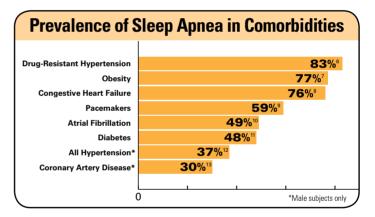
AHI = 5-14 Mild sleep apnea

AHI = 15-30 Moderate sleep apnea

AHI > 30 Severe sleep apnea

PREVALENCE OF SLEEP APNEA

- Approximately 42 million American adults have SDB¹
- 1 in 5 adults has mild OSA²
 - 1 in 15 has moderate to severe OSA²
- 9% of middle-aged women and 25% of middle-aged men suffer from OSA³
- Prevalence similar to asthma (20 million) and diabetes (23.6 million of US population)⁴
- 75% of severe SDB cases remain undiagnosed⁵



INCREASED RISK FACTORS FOR SLEEP APNEA

- Male gender
- Obesity (BMI >30)
- Diagnosis of hypertension
- Excessive use of alcohol or sedatives
- Upper airway or facial abnormalities
- Smoking
- Family history of OSA
- Large neck circumference (>17" men; >16" women)
- Endocrine and metabolic disorders

CARDIOVASCULAR LINKS

- 5.7 million people in the US have heart failure (American Heart Association)
- Approximately 76% of congestive heart failure patients have SDB⁸
- Heart failure is the most expensive disorder to treat¹⁴
- OSA noted in 49% of atrial fibrillation patients¹⁰ and 30% of cardiovascular patients¹³
- OSA presents in 70% of heart attack patients with AHI \geq 5 and 52% of heart attack patients with AHI \geq 10 15



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HYPERTENSION LINKS

- Studies have shown that sleep apnea is an independent risk factor for hypertension
- 30-83% of patients with hypertension have sleep apnea^{6,12}
- 43% of patients with mild OSA and 69% of patients with severe OSA have hypertension⁵
- AHA guidelines on drug-resistant hypertension have shown treatment of sleep apnea with CPAP likely improves blood pressure control



TYPE 2 DIABETES LINKS

- -48% of type 2 diabetes sufferers have sleep apnea11
- —OSA may have a causal role in the development of type 2 diabetes¹⁶
- —OSA is associated with insulin resistance (independent of obesity)¹⁷
- —30% of patients presented to a sleep clinic have impaired glucose intolerance¹⁸
- —Mild forms of SDB may be important in predicting risk of pre-diabetes¹⁹
- -86% of obese type 2 diabetic patients suffer from sleep apnea²⁰

STROKE RISK

- -65% of stroke patients have SDB²¹
- —Up to 70% of patients in rehabilitation therapy following stroke have significant SDB (AHI >10)²²

MORTALITY LINKS

- —SDB is associated with a 3-fold increase in mortality risk⁵
- —There is an independent association of moderate to severe OSA with increased mortality risk³
- -Severe sleep apnea raises death risk by 46%²³

HEALTH CARE COSTS

(Economic consequences of untreated SDB)

- —Undiagnosed patients used \$200,000 more in the two-year period prior to diagnosis than matched controls²⁴
- —Prior to sleep apnea diagnosis, patients utilized 23–50% more medical resources²⁵
- —Total economic cost of sleepiness = approximately \$43–56 billion²⁶
- —Undiagnosed moderate to severe sleep apnea in middle-aged adults may cause \$3.4 billion in additional medical costs in the US²⁷

TRAFFIC ACCIDENTS

- —People with moderate to severe sleep apnea have an up to 15-fold increase of being involved in a traffic accident²⁸
- People with sleep apnea are at twice the risk of having a traffic accident²⁹
- —Treating all US drivers suffering from sleep apnea would save \$11.1 billion in collision costs and save 980 lives annually³⁰

Treatment of OSA with CPAP

- Treatment of OSA resulted in a 10 mmHg reduction in blood pressure which would reduce stroke risk by 56% and coronary heart disease risk by 37%³¹
- CPAP treatment reduces the need for acute hospital admission due to cardiovascular disease in patients with sleep apnea³²
- One month of CPAP improves daytime blood pressure, heart rate and left ventricular function³³
- CPAP reduces blood glucose levels³⁴
- Two nights of CPAP improves insulin sensitivity, sustained at the 3-month interval³⁵
- For every dollar spent on CPAP, \$3.49 would be saved in reduced collision costs³⁰
- CPAP improved the prognosis of heart failure patients with OSA³⁶

1. Young et al. New Engl J Med 1993 2. Young et al. J Am Med Assoc 2004 3. Marshall et al. Sleep 2008 4. US Department of Health and Human Services, Centers for Disease Control and Prevention 2008 5. Young et al. Sleep 2008 6. Logan et al. J Hypertens 2001 7. O'Keeffe & Patterson. Obes Surg 2004 8. Oldenburg et al. Eur J Heart Fail 2007 9. Garrique et al. Circulation 2007 10. Gami et al. Circulation 2004 11. Einhorn et al. Endocr Pract 2007 12. Sjostrom et al. Thorax 2002 13. Schafer et al. Cardiology 1999 14. Medicare - \$20.4 billion p.a. 15. Kuniyoshi et al. J Am Coll Cardiol 2008 16. Reichmuth et al. Am J Respir Crit Care Med 2005 17. Punjabi et al. Am J Respir Crit Care Med 2002 18. Meslier et al. Eur Respir J 2003 19. Stamatakis et al. Sleep 2008 20. Foster et al. Diabetes Care 2009 21. Dyken et al. Stroke 1996 23. Punjabi et al. PLoS Medicine 2009 24. Kryger et al. Sleep 1996 25. Smith et al. Chest 2002 26. Leger et al. Sleep 1994 27. Kapur et al. Sleep 1999 28. Horstmann et al. Sleep 2000 29. Teran-Santos et al. New Engl J Med 1999 30. Sassani et al. Sleep 2004 31. Becker et al. Circulation 2003 32. Peker et al. Am J Respir Crit Care Med 2004 36. Kasai et al. Chest 2008