

Sleep apnea and sleep fragmentation contribute to brain aging

Kneginja Richter^{1,2,3}, Lence Miloseva³, Günter Niklewski^{1,3}

1. University Clinic for Psychiatry and Psychotherapy, Paracelsus Private Medical University, Nuremberg, Germany
2. Georg Simon Ohm University for applied sciences, Nuremberg, Germany
3. Faculty for Medical Sciences, University Goce Delcev, Stip, Macedonia

Abstract

Sleep apnea is a frequent disturbance with prevalence of 3-4% in adult man (Young, 1993, Shepertycky, 2005), and is 2-9 times more prevalent in men than women (Bozkurt 2008). The most prominent Symptoms of Sleep Apnoea are intermittent breaks of breathing in the night (Apnoea) which causes general hypoxia and daily sleepiness. Risk factors for Sleep Apnoea are vascular Hypertonia, Smoking, Obesitas, Diabetes mellitus and age (Guilleminault 1984). The Consequences of Sleep apnea are cardio-vascular diseases including Heart Infarctation and Brain Apoplexy, as well as Depression and cognitive decline. The Diagnosis of Sleep Apnea can be made by Polygraphy and/or Polysomnography recording in Sleep labor according to the following criteria: more than 10 Apneas in one hour of sleep , each with duration longer than 10 seconds.

The reason for cognitive decline in Patients with Sleep Apnea is the intermittent Hypoxia which causes disturbances of memory, attention and learning (Wolkove 2007, Spira 2008, Ancoli-Israel 1991, Cynthia 2002).

According to actually studies, Hypoxia causes cellular damage of left hippocampus area which is one of the key brain areas for the cognition and memory (Torelli 2011, Paul 2002, Mary 2003).

But not only Hypoxia as result of apneas can induce cognitive decline, also the fragmentation of the sleep by frequent awakening caused by intermittent apneas impairs the consolidation of the memory especially in the REM (Rapid eye movement) sleep stage of the sleep.

Sleep apnea and sleep fragmentation can be significant factors for brain aging causing severe disturbances of the cognition through hypoxia of the brain and Hyperarousals (stress).

Sleep apnea and Sleep fragmentation in elderly correlates with cognitive decline both in the fluid and crystal intelligence. Those Elderly having Sleep apnea and frequent sleep fragmentation are on risk for cognitive decline. Healthy elderly with good sleep have good cognitive reserve and delayed brain aging.

Early Prevention of Sleep Apnea can probably protect from early brain aging.

Keywords: Brain Aging, Sleep Apnea, Sleep disturbances, Sleep Fragmentation

References:

- 1.Young, T.; Palta, M.; Dempsey, J.; Skatrud, J.; Weber, S.; Badr, S. (1993): The occurrence of sleep-disordered breathing among middle-aged adults. In: *N. Engl. J. Med.* 328 (17), S. 1230–1235.
- 2.Sheperdycky, Marha R.; Banno, Katsuhisa; Kryger, Meir H. (2005): Differences between men and women in the clinical presentation of patients diagnosed with obstructive sleep apnea syndrome. In: *Sleep* 28 (3), S. 309–314.
- 3.Bozkurt MK, Oy A, Aydin D, Bilen SH, Ertürk IO, Saydam L, Ozgen F. Gender differences in polysomnographic findings in Turkish patients with obstructive sleep apnea syndrome. *Eur Arch Otorhinolaryngol.* 2008 Jul;265(7):821-4.
- 4.Christian Guilleminault, Rosalia Silvestri, Susanna Mondini, and Steven Coburn. Aging and Sleep Apnea: Action of Benzodiazepine, Acetazolamide, Alcohol, and Sleep Deprivation in a Healthy Elderly Group *J Gerontol* (1984) 39 (6): 655-661
- 5.Wolkove N, Elkholy O, Baltzan M, Palayew M. Sleep and aging: Sleep disorders commonly found in older people. *CMAJ.* 2007 Apr 24;176(9):1299-304.
- 6.Federico Torelli, Nicola Moscufo, Girolamo Garreffa, Fabio Placidi, Andrea Romigi, Silvana Zannino, Marco Bozzali, Fabrizio Fasano, Giovanni Giulietti, Ina Djonlagic, Atul Malhotra, Maria Grazia Marcicani, Charles R.G. Guttmann. Cognitive profile and brain morphological changes in obstructive sleep apnea. *NeuroImage*, Volume 56, Issue 2,15 January 2011, Pages 787–793

7.Spira AP, Blackwell T, Stone KL, et al. Sleep-disordered breathing and cognition in older women. *J Am Geriatr Soc.* 2008;56(1):45-50

8.Ancoli-Israel S, Kripke DF, Klauber MR, Mason WJ, Fell R, Kaplan O. Sleep-disordered breathing in community-dwelling elderly. *Sleep.* 1991;14(6):486-495