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Sleep Apnea Syndrome in the Elderly

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Summary: Sleep apnea syndrome (SAS) is a well established sleep disorder with high morbidity and mortality. Patients are most often middle-aged men. SAS occurs in at least 1% of the adult population. Several studies have suggested that SAS is extemely frequent in the elderly, its prevalence ranging from 18 to 73% in this group. However, the generalization of these results to elderly cohorts is questionable because of several limitations of these studies, including lack of standard selection criteria, variation in recording techniques, the night to night variability of sleep apnea and the use of a moderate level of sleep disordered breathing (SDB) to define SAS (5 apneas per hour). The study best designed for valid extrapolation to the whole aged population estimates the frequency of SAS at 18%. However, most of these patients reported satisfactory sleep, and epidemiologic criteria for a causal association between SAS in the elderly and cardiovascular disease have not been satisfied. The conclusions of numerous studies dealing with impairment in cognitive function and SAS in the elderly are controversial. In fact, if the diagnostic threshold is increased from 5 apneas to 10 apneas plus hypopneas per hour, elderly SAS patients have more sleep disturbances, are more depressed and have cognitive deficits as compared to normal old persons. When an appropriate diagnostic index is used, SAS in the elderly resembles SAS described in the middle-aged population. In addition, a high apnea plus hypopnea index is an ominous predictor of mortality in the elderly population, and a very high level of SDB is an extremely significant risk factor for mortality during sleep phase in these patients. This review of the epidemiologic evidence suggests that only symptomatic elderly patients need to be recorded in a sleep laboratory to diagnose and treat a sleep apnea syndrome. Epidemiologic studies including more numerous and more severely affected subjects are required to analyze the natural history of SDB in the elderly.

Sleep apnea syndrome (SAS) is a well-established sleep disorder with high morbidity and mortality. It is characterized by recurrence of disordered breathing, apneas and hypopneas during sleep (SDB). Patients are most often middle-aged men. They suffer from daytime dysfunction, such as hypersomnolence and cardiovascular disease (1). Several reports have shown convincingly that mortality is increased in patients with SAS (2,3). The treatment, continuous positive airway pressure (CPAP) or surgery, is remarkably efficient, leading to reversal of SDB and its sequelae (3,4). The true prevalence of SAS has not yet been established, but it is estimated to be around 1% in the general population (5). Numerous studies have found much higher incidence of SDB in subjects older than 60 years (6–11). The natural history of this abnormality is unknown. Many symptoms of SAS are similar to those associated with aging, e.g. memory and cognitive dysfunction. By analogy with the SAS in middle-aged subjects, abnormal respiratory events during sleep in older persons can be hypothesized to contribute to some of the risks and complaints of aging and even to influence longevity. Total sleep time is one of the best predictors of death in subjects older than 70 years (12), and sleep apnea associated with insomnia or with hypersomnolence could explain this association. As information about SDB is disseminated, the public and physicians will more often entertain the possibility of SDB. When the number of old persons (about 15% of the whole population) is taken into account, a public health care problem arises. Before recommending an effort to identify SDB in the elderly, we must define more completely the incidence of SDB in the elderly and the true morbidity and mortality associated with this phenomenon.

INCIDENCE OF SAS IN THE ELDERLY

The commonly accepted polysomnographic criterion for the recognition of sleep apnea syndrome is five apneas per hour of sleep (1). Using this apnea level threshold, several studies have shown that SAS is extremely frequent in the elderly (Table 1), its frequency ranging from 26 to 73% in studied subjects (6–11). However, the generalization of these results to elderly cohorts is questionable because of the small samples

TABLE 1. *SAS in the elderly: some epidemiological studies*

Reference	n	Age Years (± SD)	% SAS
Carskadon, 1981 (6)	40	63–86	38
Coleman, 1981 (7)	97	60–85	39
Roehrs, 1983 (8)	97	61–81	26
Yesavage, 1985 (9)	41	69.5 (±6.5)	73
Ancoli-Israel, 1985 (10)	145	65–95	28
Mosko, 1988 (11)	46	60–95	26

of patients studied, the different selection criteria (asymptomatic subjects and/or symptomatic subjects), the varied recording techniques and the night-to-night variability of sleep apnea (11,13,14). The study best designed for valid extrapolation to the whole aged population is that by Ancoli-Israel et al. (9). Individuals 65 years or older were randomly selected. Among 145 volunteers, 18% had SAS. In addition, 34% had periodic leg movements (PLM) and 10% had both SAS and PLM. Nevertheless, of these SAS patients, 80% reported satisfactory sleep. This study confirms that typically SAS is widespread in the elderly but tends not to be manifested in sleep–wake complaints and probably goes untreated most of the time.

MORBIDITY AND MORTALITY ASSOCIATED WITH SDB IN THE ELDERLY

Such a high prevalence of a pathologic event in apparently healthy subjects raises the hypothesis that SDB in the elderly does not necessarily reflect pathology. However, it should be remembered that some asymptomatic disorders can be progressively devastating, as is the case with asymptomatic systemic hypertension. If apneas of this frequency in old persons truly represent disease, then we would anticipate the measurable consequences that are known to occur in younger patients with SAS (1–3). Cardiac arrhythmias and systemic hypertension are well described in middle-aged patients with SAS. Few studies have been designed to appreciate the cardiovascular consequences of SAS in the elderly (14,15). In contrast to the results in younger subjects, Knight et al. (15) did not find an increased occurrence of EKG abnormalities or abnormal findings using holter monitors in elderly SAS patients, as compared to healthy old persons. They also found no evidence for an increased predisposition to hypertension in these elderly subjects with mild SAS (an average of 17.2 apneas per hour). Clearly, further studies are needed to appreciate cardiovascular consequences of SDB in the elderly. These studies will have to include more numerous and more severely affected patients than the previous ones.

Impairment in cognitive function might also be expected to occur secondary to SAS (1). The conclusions of the numerous studies dealing with this question in the elderly are controversial. Some authors did not find any relationships between SAS and daytime mental functioning in carefully screened healthy elderly (15,16). However, other studies described a significant increased SDB in old persons with depression (17), cognitive decline (10) or even dementia (19–21). The discrepancies among these different studies could be due to the use of a moderate level of SDB (five per hour) to define SAS. Using a diagnostic threshold of 10 apneas and hypopneas per hour, Berry et al. (22) found that patients with SAS had more sleep disturbance, were more likely to awake fatigued, were more depressed and had cognitive deficits, as compared to normal old persons. We used a similar cut-off of 10 SDB to analyze the polysomnographic data of 201 consecutive patients recorded in the Respiratory Sleep Disorders Clinic of the Hospital Saint Antoine, Paris (Fleury, Hausser-Hauw, Tehindrazanarivello and Essalhi, unpublished data). All were heavy snorers with excessive daytime sleepiness. Among them, 27% were over 60 years old and 8% were older than 65 years. Sixty-seven per cent of the patients older than 60 years were suffering from SAS in this series. We did not find any difference between the age groups in terms of severity of the objective sleep disturbance (Table 2). Thus,

TABLE 2. *Anthropometric and polysomnographic data for 120 patients with SAS*

	Group I <60 years n = 84	Group II 60–65 years n = 25	Group III >65 years n = 11	p[a]
Age (years)	50 ± 1	61 ± 1	69 ± 2	—
BMI (kg/m²)	31 ± 1	30 ± 1	28 ± 2	NS
RDI (n/hour)	45 ± 3	47 ± 5	38 ± 8	NS
Total sleep time (TST) (minutes)	474 ± 11	433 ± 20	498 ± 30	NS
% of TST				
Stages 1 + 2	70 ± 3	63 ± 5	67 ± 5	NS
Stages 3 + 4	7 ± 1	6 ± 1	5 ± 2	NS
Stage REM	19 ± 1	17 ± 2	20 ± 3	NS

[a] NS = not significant.

when an appropriate diagnostic index is used, SAS in the elderly resembles SAS described in the middle-aged population.

There has been much speculation about the risk of mortality with sleep apnea in the elderly. Mitler et al. (23) found an excess of deaths occurring between 2:00 a.m. and 8:00 a.m. in the adult population. This morning peak was relatively specific to ischemic heart disease and to subjects over 65 years of age, stimulating speculation that SAS was a cause of rising mortality at night. A preliminary study published by Bliwise et al. (24) reported an association between mortality and SDB, but these results were not replicated in a larger sample. More recently, Ancoli-Israel et al. (25) followed up 233 elderly subjects in nursing homes, 70% of whom were suffering from SAS, to determine if sleep apnea was a predictor of mortality. In women, there was a strong relationship between SDB and mortality. A very high apnea plus hypopnea index (>30 per hour) was an ominous predictor of mortality among these women. All the women with >50 SDB per hour died during the sleep phase. These results show that SDB is an extremely significant risk factor for mortality in elderly women.

CONCLUSIONS

Numerous studies have found alarming frequencies of SAS in both elderly subjects with sleep complaints and asymptomatic elderly subjects. Morbidity and mortality seem to be associated with only the more severe forms of the disease. The diagnostic criteria of five apneas per hour, derived from studies in younger adults, may not be applicable to the elderly. Adjustment of the apnea index, based on studies of aging normal subjects and of aging patients with clinical sleep apnea syndrome, is necessary to ensure reliable results in clinical application. Further well-designed studies using a reliable cutting score are needed to establish clearly the incidence and the consequences of SAS in the elderly before proposing a systematic screening for SDB in this aged population. Until the results of these next studies are reported, only the symptomatic old patients must be explored and treated. The decision to treat and the choice of the most appropriate form of treatment—nasal CPAP or upper airway surgery—depend upon the accurate assessment of the severity of the disease and on the personal profile of the patient.

REFERENCES

1. Guilleminault C, van den Hoed J, Mitler M. Clinical overview of the sleep apnea syndrome. In: Guilleminault C, Dement W, eds. *Sleep apnea syndromes*. New York: Alan R. Liss, 1978.
2. He J, Kryger MH, Zorick FJ, Conway W, Roth T. Mortality and apnea index in obstructive sleep apnea: experience in 385 male patients. *Chest* 1988;94:9–14.
3. Partinen M, Jamieson A, Guilleminault C. Long-term outcome for obstructive sleep apnea syndrome patients. *Chest* 1988;94:1200–04.
4. Fleury B, Chabolle F, Laffont F, Schlegel H, Launois S, Ferrey-Hannin D, Meyer B, Derenne J Ph. Effets à trois mois de l'uvulo-palatopharyngoplastie dans le traitement du syndrome d'apnées obstructives du sommeil de l'adulte. *Rev Mal Resp* 1989;6:519–24.
5. Lavie P. Incidence of sleep apnea in a presumably healthy working population: a significant relationship with excessive daytime sleepiness. *Sleep* 1983;6:312–18.
6. Carskadon M, Dement W. Respiration during sleep in the aged human. *J Gerontol* 1981;36:420–3.
7. Coleman RM, Miles LE, Guilleminault C, Zarcone VP, van den Hoed J, Dement W. Sleep–wake disorders in the elderly: a polysomnographic analysis. *J Am Geriatr Soc* 1981;29:289–96.
8. Roehrs T, Zorick F, Sicklesteel J, Roth T. Age-related sleep–wake disorders at a sleep disorder center. *J Am Geriatr Soc* 1983;31:364–70.
9. Ancoli-Israel S, Kripke DF, Mason W, Kaplan OJ. Sleep apnea and periodic movements in an aging sample. *J Gerontol* 1985; 40:419–25.
10. Yesavage J, Bliwise D, Guilleminault C, Carskadon M, Dement W. Preliminary communication: intellectual deficit and sleep-related respiratory disturbance in the elderly. *Sleep* 1985;8:30–3.
11. Mosko SS, Dickel MJ, Paul T, Latour T, Dhillon S, Ghanim A, Sassin JF. Sleep apnea and sleep-related periodic leg movements in community resident seniors. *J Am Geriatr Soc* 1988; 36:502–8.
12. Kripke DF, Simons R, Garfinkel L, Hammond C. Short and long sleep and sleeping pills: is increased mortality associated? *Arch Gen Psychiatry* 1979;16:103–16.
13. Witting RM, Romaker A, Zorick FJ, Roehrs TA, Conway WA, Roth T. Night-to-night consistency of apnea during sleep. *Am Rev Respir Dis* 1984;129:244–6.
14. Mason WJ, Ancoli-Israel S, Kripke D. Apnea revisited: a longitudinal follow-up. *Sleep* 1989;12:423–9.
15. Knight H, Millman RP, Gur RC, Saykin AJ, Doherty JU, Pack AI. Clinical significance of sleep apnea in the elderly. *Am Rev Respir Dis* 1987;136:845–50.
16. Berry D, Phillips B, Cook Y, Schmitt F, Gilmore R, Patel R, Keener T, Tyre E. Sleep-disordered breathing in healthy aged persons: possible daytime sequelae. *J Gerontol* 1987;42:620–6.
17. Bliwise DL, Yesavage JA, Sink J, Wildrow L, Dement W. Depressive symptoms and impaired respiration in sleep. *J Cons Clin Psychol* 1986;54:734–5.
18. Billard M, Abboudi G, Dermenghem M, Passouant P. Apnées au cours du sommeil et détérioration mentale chez les sujets âgés. *Rev EEG Neurophysiol* 1980;10:290–6.
19. Erkinjuntti T, Partinen M, Sulkava R, Telakivi T, Salmi T, Tilvis R. Sleep apnea in multiinfarct dementia and Alzheimer's disease. *Sleep* 1987;10:419–25.
20. Bliwise DL, Yesavage JA, Tinklenberg JR, Dement WC. Sleep apnea in Alzheimer's disease. *Neurobiol Aging* 1989;10:343–6.
21. Ancoli-Israel S, Klauber MR, Butter N, Parker L, Kripke DF. Dementia in institutionalized elderly: relation to sleep apnea. *J Am Geriatr Soc* 1991;39:258–63.
22. Berry TR, Phillips BA, Cook YR, Schmitt F, Honeycutt NA, Arita A, Allen RS. Geriatric sleep apnea syndrome: a preliminary description. *J Gerontol* 1990;45:M169–74.
23. Mitler MM, Hajdukovic RM, Shafor R, Hahn PM, Kripke DF. When people die: cause of death versus time of death. *Am J Med* 1987;82:266–74.
24. Bliwise D, Bliwise N, Partinen M, Purshley A, Dement W. Sleep apnea and mortality in an aged cohort. *Am J Pub Health* 1988; 78:544–7.
25. Ancoli-Israel S, Klauber MR, Kripke D, Parker L, Cobarrbias M. Sleep apnea in female patients in a nursing home: increased risk of mortality. *Chest* 1989;96:1054–8.
26. Prinz PN, Vitiello MV, Raskind MA, Thorpy MJ. Geriatrics: sleep disorders and aging. *N Engl J Med* 1990;323:520–6.