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INCIDENCE OF SLEEP APNEA SYNDROMES IN GENERAL PATIENTS AT A HOSPITAL FOR INTERNAL MEDICINE

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ABSTRACT

Incidence of sleep apnea syndromes in the general population in Japan is unknown. To investigate this incidence in Japan, sleep apnea syndromes were carefully diagnosed for all patients who visited a private hospital located in Naka Ward, Nagoya, from November 1, 1983, until April 30, 1985. A total of 9132 patients were examined by four doctors. Insomnia, heavy snoring, daytime hypersomnia, short-thick neck, hypertrophied tonsils, obesity, and micrognathia were considered important clues for diagnosis of sleep apnea syndromes. Patients with signs and symptoms of possible sleep apnea syndromes underwent either an ear-oximeter test or a recording of snoring. Final diagnosis was determined by polysomnography.

Sleep apnea syndromes were diagnosed in 26 (23 males and 3 females) out of 9132 patients, the percentage among general patients being 0.285%. The percentage was specifically high (0.785%) in male patients between the age of 40 and 69; and 19 out of all 26 patients with sleep apnea syndromes were in this age group. Among the 26 sleep apnea patients, 17 had hypertension, 9 had diabetes mellitus, and 5 suffered from depression.

The percentage of patients with sleep apnea syndromes in this study might actually have been higher because there were more than six patients with suspicious symptoms, whose diagnostic work-up could not be completed.

Key words: Sleep apnea syndrome, Incidence, Ear-oximeter test, Diabetes mellitus, Hypertension

INTRODUCTION

Sleep apnea syndromes, conditions of repetitive and long-lasting breathing cessations during sleep, are often life-threatening[1),2)] and are not rare among certain patients in the United States. Kales A. *et al.* reported that 15 (30%) out of 50 hypertensive patients had sleep apnea syndromes, while none of the control persons had these syndromes[3)]. Coleman R. M. reported that out of 3900 patients with sleep-wake disorders, 23.9% had sleep apnea syndromes diagnosed by polysomnography[4)]. In Japan, Hamahara *et al.* reported that in patients with insomnia, five out of nine males and one out of six females had sleep apnea syndromes[5)]. However, the patients investigated in all of those studies were restricted to particular diseases or ages. For instance, all of the patients reported in the study of Hamahara *et al*[5)]. were over 60 years old. As there is no report dealing with the incidence of sleep apnea syndromes among general patients, we undertook to investigate the occurrence of sleep apnea syndromes among patients at one hospital for internal medicine in the city of Nagoya.

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MATERIALS AND METHODS

All patients 9132 in total, who visited K hospital located in Naka Ward, Nagoya, between November 1, 1983, and April 30, 1985, were listed in this study. Four doctors specially trained to determine sleep apnea syndromes examined these patients. Short-thick neck, micrognathia, obesity, and large tonsils were considered important anatomical signs, and insomnia, snoring, and daytime hypersomnia were considered important symptoms for diagnosis of sleep apnea. Patients suspected of sleep apnea syndromes underwent the ear-oximeter test using an ear-oximeter type IIA (Biox Techonology Co. Colorado, U.S.A.), performed on an all-night schedule. Several patients underwent recording of snoring by tape recorder, in place of the ear-oximeter test, with the aid of family members, also performed on an all-night schedule. Sleep apnea syndromes were finally diagnosed by polysomnography performed at Nagoya University Hospital for those patients showing abnormalities in the screening tests. Polysomnograms were recorded according to the method reported by Rechtschaffen A. and Kales A[6]. In addition to routine indicators, i.e., electro-encephalogram (EEG), electro-oculogram (EOG), and electro-myogram (EMG), air flow at nostril and mouth, and actogram of the thorax and abdomen were also monitored. Diagnostic criteria of sleep apnea syndromes reported by the Sleep Disorders Classification Committee in the United States[7] were used in this study. Ideal body weight was calculated by the following formula:

$$(\text{Height}-100) \times 0.9 = \text{Ideal body weight (kg)}$$

RESULTS

1. Occurrence of sleep apnea syndromes in general patients at one private hospital for internal medicine

As shown in Table 1, 23 (0.496%) out of 4633 male patients had sleep apnea syndromes,

Table 1. Occurrence of sleep apnea syndromes in relation to age and sex of the patients.

Ages	Number of patients			
	Male		Female	
	Sleep apnea	Total	Sleep apnea	Total
10–19	0	81	0	226
20–29	0	541	0	513
30–39	1	644	0	383
40–49	8	736	0	532
50–59	7	822	2	819
60–69	4	861	0	1064
70–79	3	811	1	806
80–89	0	134	0	146
90–99	0	3	0	9
100–109	0	0	0	1
Total	23*	4633	8**	4499

* Occurrence of sleep apnea syndromes in male patients was 0.496%.
** Occurrence of sleep apnea syndromes in female patients was 0.067%.

Table 2. Clinical profiles of sleep apnea syndromes

Case No.	Age	Sex	Basic disorders	Sleep-wake disorders	Deviation from ideal body weight (%)	Type of** Apnea	No. of Apnea	Apnea*** index
1	53	M	Hypertension Depression	EDS*	+22	M+O	465	67
2	64	M	Hypertension Bronchiectasis	Insomnia	+25	O	242	46
3	72	M	Hypertension	None	+20	O	305	44
4	77	F	Hypertension Cerebral infraction	EDS	+34	O	49	10
5	46	M	Hypertension Depression	Insomnia	+40	O	208	29
6	75	M	Hypertension Diabetes mellitus	Insomnia	+25	O+M	208	36
7	50	M	Hypertension	Insomnia	+16	O	83	14
8	55	M	Hypertension Chronic hepatitis	Insomnia+EDS	+39	O	35	5
9	41	M	Hypertension Gastric ulcer	Insomnia	+17	O	121	16
10	58	M	Diabetes mellitus Aortic aneurysm	EDS	+15	M	72	13
11	60	M	Diabetes mellitus	EDS	0	O	140	46
12	48	M	Hypertension Depression Chronic hepatitis	Insomnia	0	O	50	9
13	47	M	Alcoholism Chronic hepatitis Depression	Insomnia	+37	O	39	5
14	50	M	Diabetes mellitus Hypertension Depression	Insomnia+EDS	+20	O	38	5
15	45	M	Hypertension	EDS	+21	O	41	6
16	55	F	Hypertension Cholelithiasis	Insomnia	+35	O	40	11
17	57	M	Diabetes mellitus Hypertension Myocardial infarction	EDS	+20	O	119	21
18	44	M	Ischialgia	EDS	+26	O	309	49
19	60	M	Kidney tumor	Insomnia	+2	M+C	243	40
20	52	M	Diabetes mellitus	Insomnia	+19	O	34	5
21	54	F	Duodenal ulcer Hypertension	EDS	+23	O	32	6
22	40	M	Hypertension	Insomnia+EDS	+22	O	218	36
23	45	M	Diabetes mellitus	Insomnia+EDS	+29	O	46	7
24	70	M	Cerebral infarction	None	+7	M+O	153	58
25	35	M	Nephritis Diabetes mellitus	EDS	+49	O	526	69
26	67	M	Diabetes mellitus Hypertension Cerebral hemorrhage	Insomnia	+3	O	231	48

* EDS: Eccessive daytime somnolence.

** O: obstructive type, C: central type, M: mixed type, M+O, O+M, M+C: Types of apnea appeared in these orders.

*** No. of apnea per 1 hour of sleep.

while only 3 (0.067%) out of 4479 female patients had them. In patients between the age of 10 and 39, only one male had sleep apnea syndromes. On the other hand, in patients between the age of 40 and 69, 19 males (0.785%) and 2 females (0.082%) had them.

2. Clinical profiles of 26 patients with sleep apnea

As shown in Table 2, among 26 patients with sleep apnea, 23 were males and 3 were females. Seventeen had hypertension, 9 had diabetes mellitus, and 5 suffered from depression. Eleven complained only of insomnia; 8, only of excessive daytime somnolence; 4, of both insomnia and excessive daytime somnolence; and 2, of neither of the two. Twenty-one patients showed dominantly obstructive-type apnea; 1, mixed-type apnea; 3, obstructive-type apnea with short periods of central apnea; and 1, central apnea with a short period of obstructive apnea. Mean frequency of apnea in one night was 155.7, ranging from 32 to 526. Mean apnea index (number of apnea per 1 hour of sleep) was 26.9, ranging from 5 to 69. Mean deviation of the actual body weight from the ideal body weight in sleep apnea patients was +24.4%, ranging from 0 to +49%.

3. Case report (Case 1 in Table 2)

A 53-year-old male, 164 cm tall and weighting 64 kg, had a chief complaint of cough. On December 2, 1983, he visited K Hospital because of severe cough and was suffering from a common cold. He had micrognathia and large, swollen tonsils, and he complained of snoring and excessive daytime somnolence after careful questioning. He directly underwent polysomno-

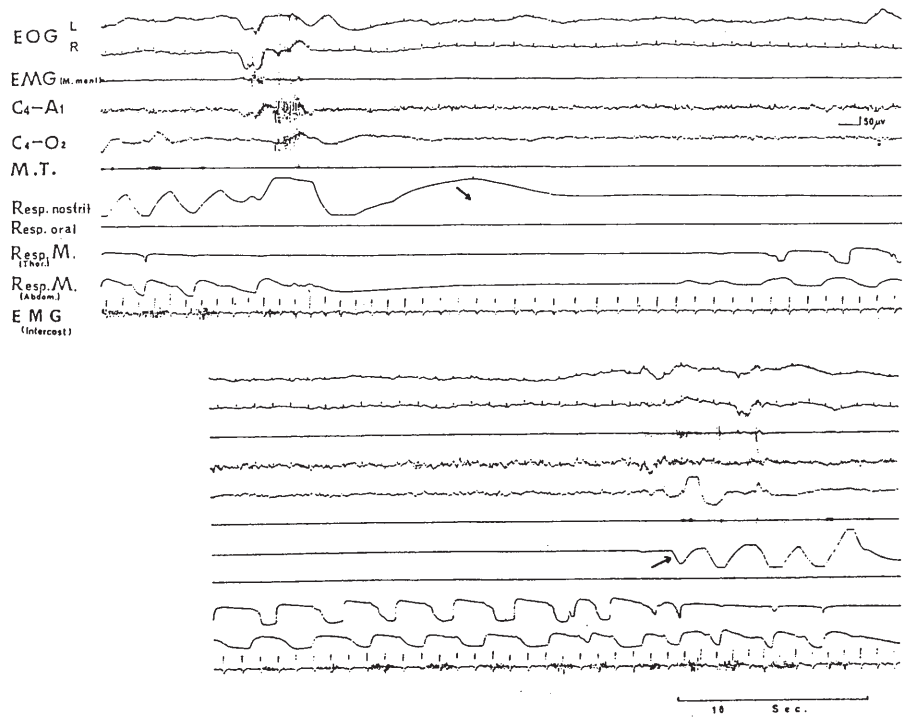

Fig. 1 Polysomnograms in Case 1. Arrows indicate the stop and the start of respiration, respectively. Complete stops of nostril respiration associated with cessation of thoracic and abdominal muscle movements indicate central apnea, while stops of the nostril respiration associated with thoracic and abdominal muscle movements indicate obstructive apnea.

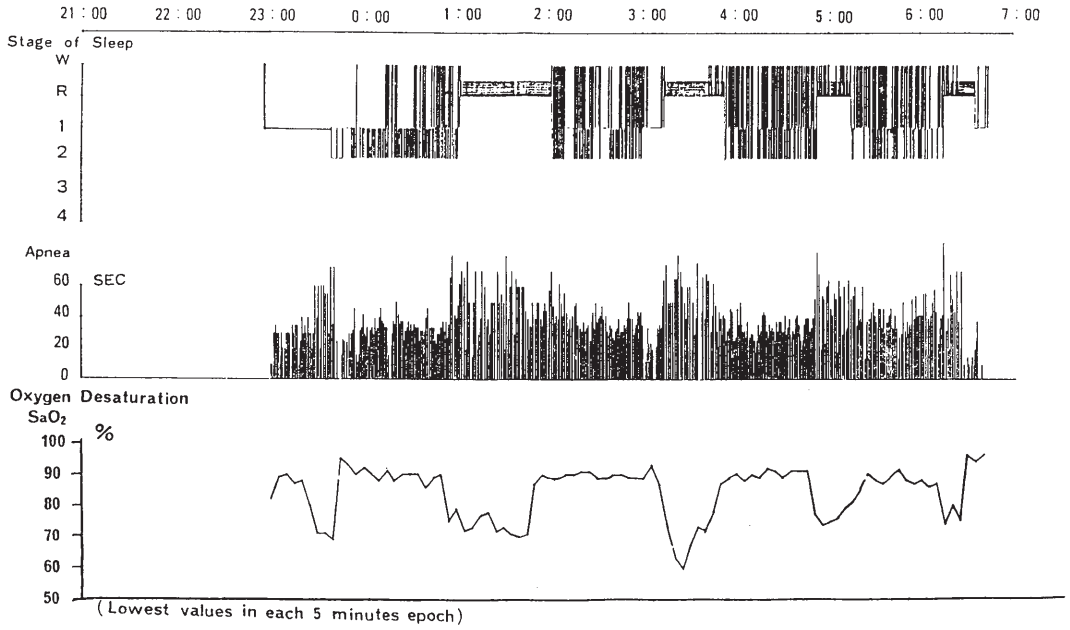

Fig. 2 Relationship between apnea and REM periods. Stage of sleep and duration of apnea monitored by the polysomnograph and oxygen desaturation of blood monitored by the ear-oximeter test were compared. W: wake periods, R: REM periods. Middle column shows periods of apnea. Oxygen desaturation was monitored by an ear-oximeter. In REM periods, oxygen desaturation and duration of apnea increased simultaneously.

graphy, and final diagnosis of sleep apnea syndromes was established. His polysomnograms are shown in Figures 1 and 2. A typical mixed pattern of central apnea accompanied with obstructive pattern was observed (Fig. 1). There was an intimate relationship between the apnea duration and the REM period of sleep (Fig. 2).

4. Screening tests

As a screening test prior to the laborious polysomnography the ear-oximeter test was performed on an all-night schedule for approximately 100 patients suspected of sleep apnea syndromes. A normal pattern of the oximeter test is shown in Fig. 3. An abnormal pattern of the test in a sleep apnea patient (No. 11 in Table 2) is shown in Fig. 4; cyclic desaturation of oxygen is clearly observed. All the patients showing abnormal patterns and some showing borderline patterns in the test were finally proved to have sleep apnea syndromes by polysomnography. Snoring was recorded on an all-night schedule for 15 patients suspected of sleep apnea syndromes. Among them, 2 patients showing cessation of snoring over 30 times a night, each duraction longer than 10 sec, underwent polysomnography, and sleep apnea syndromes were diagnosed in both of them. However, it took much time for doctors to analyse the results of recorded snoring although the tapes were played back at high speed.

DISCUSSION

In order to estimate the occurrence of sleep apnea syndromes in the general population in

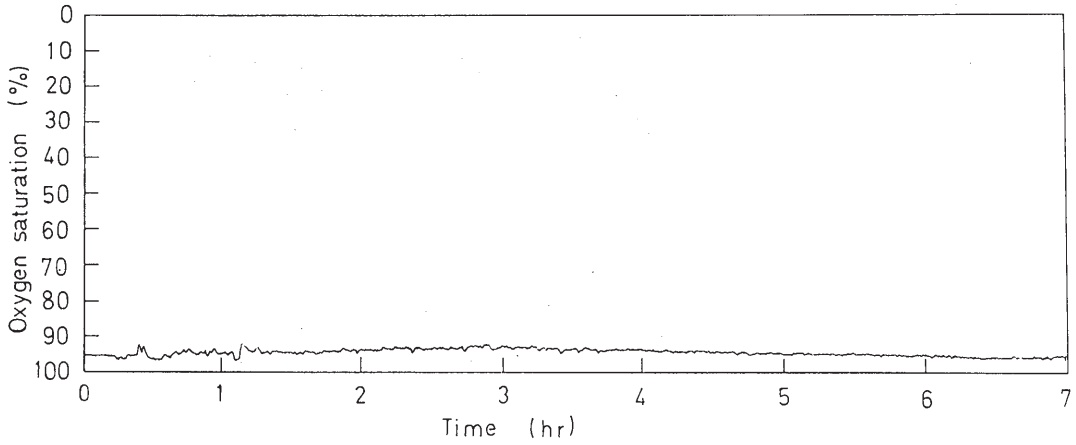

Fig. 3 A normal pattern of the ear-oximeter test.

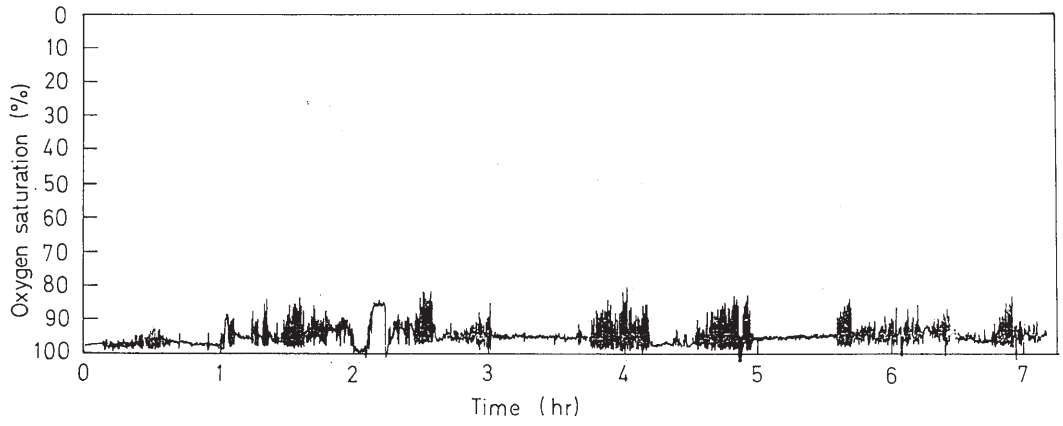

Fig. 4 An abnormal pattern of the ear-oximeter test.

Japan, we undertook to determine the occurrence among all patients who visited one hospital in Nagoya between November 1, 1983, and April 30, 1985. In this study, patients suspected of sleep apnea syndromes usually underwent either the ear-oximeter test or a recording of snoring, both performed on an all-night schedule. All patients showing abnormality in the oximeter test were disclosed to have sleep apnea by polysomnograms, which coincides with the results reported by Okada[8]. Patients suspected of sleep apnea should be underwent the laborious polysomnography for the final diagnosis. Present results indicate that the oximeter test can be used as an easy screening test for sleep apnea syndromes. Recording of snoring was also useful, but it took much time for doctors to analyze the results.

In the present study, the occurrence of sleep apnea syndromes in general patients was found to be 0.285%, and the occurrence in males, especially middle-aged males, was excessively high. Similar features were also reported by other researchers in Japan[5),8)] although they studied somewhat selected patients. The occurrence of sleep apnea syndromes might actually be a little

higher than reported here because there were more than six patients suspected of these syndromes who refused to undergo the ear-oximeter test or polysomnography. Furthermore, efforts to find other sleep apnea patients are still continuing among the listed patients described above.

We believe that the present study is the first report concerning the occurrence of life-threatening sleep apnea syndromes in general patients in Japan.

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