

## Sleep Habits and Symptoms in Male Medical and Surgical Patients

M. W. JOHNS,\* M.B., B.S., B.SC.

P. EGAN,† ; T. J. A. GAY,‡ B.MED.SC.

J. P. MASTERTON,§ M.B., DIP.OBST., F.R.C.S.

**S**ummary: A questionnaire survey of symptoms and sleep habits at home among 100 adult male medical and surgical patients showed that the duration of sleep at night was similar to that reported for the general population, decreasing with age from 20 to 50 years and increasing again after 60 years. The duration of daytime sleep increased with age. The degree of sleep disturbance in different patients was compared in terms of the total duration of sleep and the time spent lying awake in bed at night. Increasing age, ischaemic heart disease, and neurotic illness were the main factors associated with long-term disturbances.

### Introduction

One of the oldest and most widely used therapeutic manœuvres in medicine is to put the patient to bed, to rest, and, in particular, to sleep. Disturbances to sleep are known to be common among psychiatric patients, particularly in those suffering from anxiety and depression (McGhie, 1966; Hawkins and Mendels, 1968), but surprisingly little is known about the sleep habits of patients in different age groups who have physical symptoms. Rudolf (1955) studied the sleep of small groups of patients treated by physicians at home and in hospital, using daily records of the hours of sleep. He suggested that patients with cardiovascular disease slept less than those with gastrointestinal, genitourinary, or respiratory disease. The few patients investigated and the absence of a detailed description of symptoms made this conclusion only

\*Research Fellow.

†Medical Student.

‡Research Student.

§Associate Professor of Surgery.

Department of Surgery, Monash University, Melbourne, Australia.

tentative. Weiss *et al.* (1962) found that chronic sleep disturbances, as reported in a sleep questionnaire, increased with age in groups of psychiatric patients, medical patients, and healthy airforce personnel. The psychiatric patients had significantly more sleep disturbance than the medical patients, who did not differ significantly from the healthy controls. Neither the symptoms nor the diagnoses of these patients were described.

A sleep questionnaire was used to describe a pattern of increasingly disturbed sleep with age in healthy adults in Scotland (McGhie and Russell, 1962), and Monroe (1967) showed that different subjective responses to such a sleep questionnaire by "good" and "poor" sleepers reflect objective differences in sleep measurements. Lewis (1969) suggested that individual subjective reports about a night's sleep tend to underestimate the total sleep time and overestimate the delay to sleep onset as measured by electroencephalographic methods in a sleep laboratory. Nevertheless, the overall correlation between subjective and objective reports of sleep measurements in Lewis's study was significant and justified the use of subjective reports to compare sleep habits in groups of people.

We have designed a questionnaire to study the usual pattern of sleep in male patients admitted to the general medical and surgical wards of a large teaching hospital in Melbourne. This paper deals with changes with age in the sleep habits of such patients when they are at home as well as the relation between their sleep disturbances and physical and psychological symptoms.

### Methods

*Questionnaires.*—The sleep questionnaire consisted of 28 questions relating to most subjective aspects of an average night's sleep. A range of possible answers was provided from which the patients selected the most appropriate. Detailed information about physical illness and symptoms as well as a rating for neurotic illness was provided by the male version of the Cornell Medical Index (C.M.I.) Health Questionnaire (Brodman *et al.*, 1949; Culpan *et al.*, 1960). This is a self-administered questionnaire divided into 18 sections dealing with different physical and psychological symptoms and historical data (see Table III). The relationships between age, symptoms, and various sleep measurements were analysed by means of Student's *t* test, product-moment correlation coefficients, and partial correlation coefficients. Statistical significance was accepted at the 0.05 probability level in a two-tailed test.

*Selection of Patients.*—Patients were selected over a three-week period from the general medical and surgical wards of the Alfred Hospital, a teaching hospital where the mean duration of patient admission is about 10 days. Questionnaires were handed out to 137 patients on the basis of their being well enough and co-operative enough to sit up and write the answers to the 223 questions embodied in the two questionnaires. One hundred patients returned completed questionnaires. No attempt was made selectively to include or exclude any particular diagnostic group of patients. Forty-seven occupied medical beds and 53 were in surgical beds. Their diagnoses covered a wide range of those to be found in general medical and surgical wards of a teaching hospital—from carcinoma of the larynx to appendicitis, and from haemophilia to myocardial infarction. Their ages ranged from 15 to 83 years. The frequency distribution of ages is shown in Table I. Before coming into hospital all patients had been ambulant for most of the day at least. None was receiving psychiatric treatment at the time, though a few had done so in the past.

TABLE I.—*Frequency Distribution of Ages of Patients Studied*

Age in years . . . . .	15-19	20-29	30-39	40-49	50-59	60-69	70+
No. of patients . . . . .	6	15	10	17	24	18	10

## Results

### Variations in Sleep Habits with Age

The results are summarized in Table II. Elderly patients went to bed earlier but took longer to fall asleep than young patients. On weekdays there was little change with age in the time of finally waking up in the morning, but the delay before getting out of bed increased with age. Most men, especially the younger ones, went to bed later at weekends, woke up later the next morning, and lay awake in bed longer at weekends than on weekdays.

Both the frequency and the duration of awakenings during the night increased with age. Difficulty in getting back to sleep was closely related to difficulty in getting to sleep initially. The commonest reasons for waking up during the night were nocturia (34 patients), "unknown reasons," and "nervous tension." A few patients woke up regularly because of dyspnoea, cough, leg pain, noise, or dreams. No patient in this series reported waking up frequently because of chest or abdominal pain, though a few had been awakened occa-

TABLE II.—Variations with Age in the Sleep Habits of Male Patients

Sleep Habits	Age in Years						Correlation with Age (r)	Statistical Significance (P)
	15-19	20-29	30-39	40-49	50-59	60-69		
Time of going to bed on weekdays (p.m.)	10.0	11.15	10.15	10.05	10.10	10.00	0.36	<0.001
Time of going to bed at weekends (a.m.; p.m.)	12.25	12.15	10.45	10.55	10.50	10.15	-0.57	<0.001
Time of falling asleep on weekdays (p.m.)	10.20	11.40	10.45	10.30	10.40	10.25	-0.26	<0.01
Time of falling asleep at weekends (a.m.; p.m.)	12.50	12.40	11.10	11.20	11.20	10.40	-0.41	<0.001
Time of morning awakening on weekdays (a.m.)	7.0	7.0	6.30	6.30	6.15	6.30	0.17	N.S.
Time of morning awakening at weekends (a.m.)	8.30	9.0	7.0	7.30	6.45	6.55	-0.39	<0.001
Delay before getting up on weekdays (minutes)	14	18	23	20	12	28	+0.21	<0.05
Delay before getting up at weekends (minutes)	33	42	40	33	28	46	-0.03	N.S.
Number of night awakenings per week	1.4	0.7	2.6	4.0	4.2	11.0	+0.33	<0.001
Total duration of night awakenings (hours per week)	0.3	0.3	2.0	2.0	3.7	5.1	+0.36	<0.001
Total duration of daytime sleep (hours per week)	0.0	0.1	1.0	0.8	0.9	3.1	+0.40	<0.001

sionally this way. Thirty-nine patients reported sleeping during the day at some time during the average week. The frequency and duration of daytime sleep increased with age, and this almost compensated for the sleep which each age group tended to lose owing to awakenings during the night (Table II).

The use of hypnotics increased with age, so that one in five of the patients over 50 years took them regularly. Only 15 of the 31 patients who took hypnotics frequently or occasionally could give information about the type of tablet, the commonest ones named being barbiturates (nine patients), of which amylobarbitone was the single drug most often used. Three patients took aspirin as a hypnotic rather than as an analgesic.

The mean total duration of sleep for all patients was 53.7 hours per week (standard error 1.15 hours). The lowest individual amount reported was 21.5 hours and the highest 88.9 hours per week. The relation between age and the total duration of sleep per week, night sleep per week, and the total number of hours spent in bed at night per week is shown in Fig. 1. The total sleep and night sleep decreased from 15-19

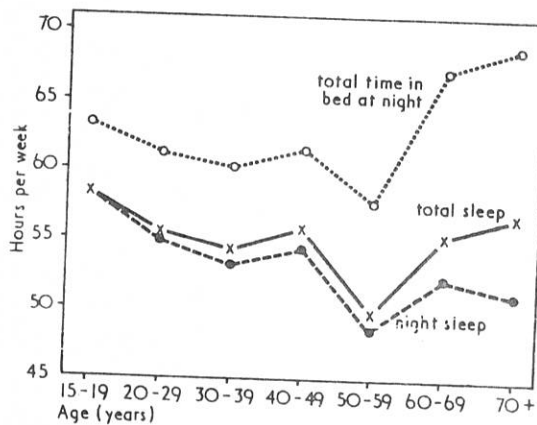


FIG. 1.—Mean duration, in hours per week, of night sleep, total sleep, and total time spent in bed at night at different ages.

years to a minimum at 50-59 years and then rose again after 60 years. The duration of night sleep, but not that of total sleep, was significantly less at 50-59 years than at either 20-29 years or 60-69 years. The increasing difference with age

between night sleep and total sleep reflects the increasing amount of daytime sleep in older age groups. The total time spent in bed at night (either asleep or awake) fell gradually to a minimum at 50-59 years, and then rose fairly steeply.

All of the patients in the present series who usually slept less than a total of 35 hours per week complained of sleep disturbance, and many of those who slept between 35 and 55 hours per week also felt sleep-deprived, particularly if they lay awake in bed at night unable to sleep. Sleep disturbance in any particular patient may be due to long delay before getting off to sleep initially, to frequent awakenings and delay before getting back to sleep during the night, to early morning awakening, or, as is often the case to a combination of these factors, each of which increases with age. A single measurement—the total time spent lying in bed awake at night, which includes each of these three factors—can be used, along with the duration of sleep, to compare the degree of sleep disturbance in different patients. The total time spent lying awake in bed at night, and hence the degree of sleep disturbance, increased progressively with age ( $r = +0.266$ ,  $P < 0.01$ ; Fig. 2).

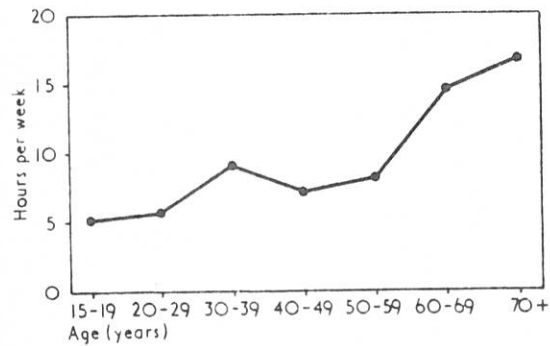


FIG. 2.—Number of hours per week spent lying awake in bed at night at different ages.

### Variations in Symptoms with Age

There were significant increases with age in the number of symptoms of eye and ear disease and of cardiovascular and genitourinary disease. By contrast, the number of symptoms referable to the nervous system decreased with age. The lat-

ter symptoms were mainly of functional illness, such as headaches, stammering, and feeling of faintness. None of the scores in other C.M.I. sections changed significantly with age.

### Symptoms and Sleep Disturbances

The relationships, as indicated by partial correlation coefficients, with constant age, between the number of "yes" answers in each section of the C.M.I. and various measurements of sleep in hours per week are shown in Table III. The duration of night sleep was significantly reduced at all ages when there were many cardiovascular symptoms. Day

TABLE III.—*Partial Correlation Coefficients, with Age Constant, between Symptoms Relating to Particular Bodily Systems and Sleep*

C.M.I. Section		Partial Correlation Coefficient Between Number of "Yes" Answers in C.M.I. Section and Hours per Week of			
		Night Sleep	Day Sleep	Total Sleep	Time Awake in Bed at Night
A,	Eyes, Ears .. .. .	○	○	○	○
B,	Respiratory .. .. .	○	○	○	○
C,	Cardiovascular .. .. .	-	++	-	+++
D,	Digestive .. .. .	○	○	○	○
E,	Musculoskeletal .. .. .	○	+++	○	○
F,	Skin .. .. .	○	○	○	○
G,	Nervous System .. .. .	-	○	-	++
H,	Genitourinary .. .. .	○	○	○	○
I,	Fatigability .. .. .	-	○	-	+++
J,	Frequency of Illness .. .. .	○	○	○	++
K,	Miscellaneous Diseases .. .. .	○	○	○	○
L,	Habits .. .. .	○	○	○	+
M-R,	Mood and Feelings .. .. .	○	○	○	○
Total A-R .. .. .		○	○	○	+

○ ..  $r < 0.197$ , N.S.  
 +/ - ..  $r = 0.197 - 0.257$ ,  $P < 0.05$ .  
 ++/ - - ..  $r = 0.257 - 0.324$ ,  $P < 0.01$ .  
 +++/ - - - ..  $r > 0.324$ ,  $P < 0.001$ .

sleep increased in such patients, but this did not entirely compensate for lost night sleep, so their total sleep was also reduced. There was a highly significant correlation between cardiovascular symptoms and increased amounts of time spent in bed awake at night. The total time in bed at night, both awake and asleep, was not significantly correlated with scores in any of the C.M.I. sections. There was therefore a statistical association between cardiovascular disease and sleep disturbance.

Some patients reported frequent night awakenings but did not suffer from significant loss of sleep. They were usually able to get back to sleep quickly after waking during the

night and generally obtained more daytime sleep than average. This was so with nocturia as a result of prostatomegaly and with dyspnoea as a result of bronchial asthma. Musculoskeletal symptoms were associated with increased day sleep, but not with significant disturbance to night sleep. Symptoms of nervous origin and a feeling of fatigue were associated with decreased amounts of night sleep without a compensatory increase in day sleep. Patients with these symptoms obtained less sleep overall and spent more than the average amount of time awake in bed at night. Those who lay awake in bed at night for many hours also reported greater frequency of illness of various kinds (J section, Table III). In section L, relating to habits, which is specially concerned with the use of tobacco and alcohol, decreased amounts of regular exercise and difficulty in getting off to sleep, the number of "yes" answers was correlated with the time in bed awake at night. The number of psychological symptoms as indicated by the score in C.M.I. sections M-R was not significantly correlated with any of the sleep measurements. The total C.M.I. score (sections A-R), which gives an indication of neurotic illness, was related to increased time awake in bed at night.

### Discussion

The pattern of sleep at home in this sample of Australian male patients was very similar to that described for "healthy" adults in Great Britain (McGhie and Russell, 1962; Tune, 1968, 1969). The mean duration of total sleep per week for 240 men and women in Scotland, as determined by daily subjective reports for eight weeks, was 53.2 hours (Tune, 1968) and compared with 53.7 hours per week in the present study. The variation in total sleep with age, decreasing to a minimum at 50-59 years and then increasing again after 60 years, was the same as that derived from daily reports (Tune, 1968, 1969) as well as from detailed electroencephalographic studies (Webb and Agnew, 1968). The validity of both subjective methods of obtaining information about sleep habits (daily records and sleep questionnaires) would seem to be enhanced by these results. The overall similarity between patients and "healthy" subjects in most aspects of both their sleep habits and their use of hypnotics also suggests that for most of the patients in the present study the presence of physical symptoms did not of itself produce much long-term disturbance from the "normal" pattern of sleep, a conclusion similar to that of Weiss *et al.* (1962).



The total duration of sleep may vary from day to day, especially in young adults, but is much more constant in any individual when considered over a week. In the present study, particularly in men under 40 years, those who slept less than the average amount on week nights slept significantly longer than average at weekends, and vice versa. The overall effect was for each group to approach more closely the mean amount of sleep for the whole week at that age. It would seem preferable, therefore, to describe sleep duration in terms of hours per week, as in this study, rather than hours per 24 hours.

After middle age there is a steady increase in the amount of daytime sleep and a decrease in night sleep, despite an increased time in bed at night. This is due to increasing disturbance to sleep with age—increased delay in getting off to sleep, more frequent and longer awakenings during the night, and earlier morning awakening. The change is very prominent in patients with chronic brain syndrome (Feinberg, 1967). In some respect this represents a gradual return to the polyphasic pattern of sleep seen in children, presumably as a result of degenerative changes in the central nervous system.

The present analysis of symptoms and sleep disturbances showed that men with chronic symptoms of cardiovascular disease (particularly ischaemic heart disease), as well as those complaining of multiple physical symptoms as a result of neurotic illness, have significantly increased degrees of sleep disturbance at all ages. This is manifested in the reduced duration of sleep and increased time spent awake in bed at night. As a diagnostic group the patients with ischaemic heart disease reported the most sleep disturbance. Some of these patients had evidence of significant neurotic illness, presenting as anxiety, depression, or multiple minor complaints which often follow acute episodes of heart disease. They may also have had a disorder of their sleep mechanisms as part of a more widespread disorder of their diurnal rhythms which is manifested, for example, in decreased or absent diurnal variation in plasma corticosteroid concentrations (Knapp, 1969).

As was suggested by Weiss *et al.* (1962), gastrointestinal, genitourinary, musculoskeletal, and respiratory symptoms alone did not usually cause significant long-term sleep disturbance, though there may be exceptions to this. When such symptoms were also associated with neurotic illness, however, they tended to be associated with sleep disturbance. It is not possible to say whether any of the symptoms arose as a result of long-term sleep deprivation.

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Requests for reprints should be addressed to Dr. M. W. Johns, Department of Surgery, Monash University Medical School, Commercial Road, Prahran, Victoria 3181, Australia.

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