Section 1 Introduction

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Chapter
1

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Epidemiology of excessive sleepiness

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The epidemiology of excessive sleepiness has received less attention than insomnia. Several factors have contributed to this situation: (1) there is no clear definition of what is excessive sleepiness; and (2) excessive sleepiness is not a diagnosis. There is a growing trend in the popular media to label excessive sleepiness as a distinct disorder, but to date, in the classifications, it remains a symptom or a consequence of a sleep disorder, of a physical illness, or of a mental disorder. Therefore, studying prevalence, incidence and risk factors for excessive daytime sleepiness bears little impact on the development of new treatments for this symptom.

However, as we will see, excessive sleepiness is very common in the general population. It is a disabling symptom that adversely affects the quality of life of individuals in various areas of functioning, and it is a good indicator of the presence of health problems.

In the latest edition of the International Classification of Sleep Disorders (ICSD-II), excessive sleepiness is an essential symptom to the diagnosis of 3 types of sleep disorders: hypersomnia, narcolepsy, and behaviorally induced insufficient sleep syndrome, totaling 12 different diagnoses. However, with the exception of narcolepsy, these sleep disorders have rarely been studied in the general population.

Definitions of excessive sleepiness

Table 1.1 presents a summary of excessive sleepiness definitions used in epidemiological studies. There are 14 definitions used for a total of about 40 epidemiological studies assessing excessive sleepiness. There are several important limitations when attempting to compare the different studies. (1) Some studies have assessed the excessive sleep quantity, but the majority of studies have focused on the sleep propensity during wakefulness, i.e. excessive sleepiness. The earliest studies were mostly focused on excessive sleep quantity. In the studies of the past decade, daytime sleepiness has referred to sleep propensity in situations of diminished attention. (2) The terms hypersomnia and excessive sleepiness are often used interchangeably. Hypersom-

Table 1.1 Definitions of excessive sleepiness used in epidemiological studies

	Description	# of studies using that definition
1	Hypersomnia	1
2	Sleeping too much	6
3	Falling asleep during the day	1
4	Frequent feeling of sleepiness during the day or evening that requires taking a nap	1
5	Usually sleepy in the daytime	2
6	Tendency to sleep all day	1
7	Strong need to sleep during the day	1
8	Presence of sleepiness during the previous month, ≥3d/wk	8
9	Sleepiness independent of meal times	1
10	Moderate/severe daytime sleepiness	9
11	Daytime sleepiness often or very often	2
12	Consider themselves more clearly tired than others Daily experience of desire to sleep during normal activities Feel tired every day	1
13	Tendency to fall easily asleep during the day ≥3 d/wk Periods of sudden and irresistible sleep ≥3 d/wk	5
14	Epworth Sleepiness Scale	1

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nia is a broader terminology that encompasses excessive sleep quantity or sleep propensity during wakefulness.

(3) Another aspect that makes comparisons difficult is that the time frame (for example, past week, past month, past year), frequency, severity and duration are inconsistently assessed. (4) The evaluation of the symptom is mostly limited to a single question, which differs from one study to the other. Consequently, the variance in results across studies does not make it possible to reach any definite conclusions in the matter.

Prevalence of excessive sleep quantity

A total of six studies have assessed excessive amount of sleep [1–6]. It should be noted that these studies have assessed the perception of sleeping too much or getting too much sleep. None of these studies has compared the reported sleep duration with the perception of sleeping too much. The prevalence of sleeping too much ranged between 2.8 and 9.5% in the general population with one exception: a study with young adults reported a prevalence of 16.3% [3].

Prevalence of excessive sleepiness

Eight studies have assessed excessive sleepiness, asking simply about its presence or absence using one question. An Italian study asked about the presence of "sleepiness independent of meal times" in a sample of 5713 individuals aged 3 years and older living in the Republic of San Marino. They found a prevalence of 8.7% [7]. An American study conducted with 2187 subjects aged 18 years and older in Tucson (Arizona, USA) got a prevalence of 12.3% of men and 11.7% of women falling asleep during the day [8]. Three elderly studies assessed the presence of excessive daytime sleepiness by asking the participants if they were "usually sleepy in the daytime." A first study using 5201 subjects 65 years and older from the Cardiovascular Health Study (baseline evaluation 1989–1990) reported a prevalence of 17% of men and 15% of women being "usually sleepy in the daytime" [9]. The 1993–94 evaluation included 4578 adults aged 65 and older; being "usually sleepy in the daytime" was reported by 20% of the sample in this second evaluation [10]. Using the same question, Foley *et al.* [11] obtained a prevalence of 7.7% in a sample of 2346 Japanese-American men. A Canadian study using a national sample of 1659 elderly who underwent a clinical examination obtained a prevalence of 3.9% of subjects who had a tendency to sleep all day [12]. However, sleep disturbance questions were part of the physician's assessment of depression, which may have contributed to the low prevalence of excessive sleepiness in that particular sample. A Mexican study of 1000 adult participants (≥18 years of age) reported a prevalence of 21.5% of participants who experienced a "strong need to sleep during the day" [4]. In Japan, 28 714 participants (≥20 years of age) of the Active Survey of Health and Welfare were assessed for excessive sleepiness with the following question: "Do you fall asleep when you must not sleep (for example, when you are driving a car)?" A total of 2.5% of the sample answered positively to that question [13] (Table 1.2).

Frequency of excessive sleepiness was assessed with two different approaches. Some studies have used a subjective graduated scale ranging from never to very often or always, while others have used the number of days per week with excessive sleepiness. A Swedish study involving 3557 adults aged between 30 and 65 years reported a prevalence of 5.2% of men and 5.5% of women being often or very often sleepy during the daytime [14]. A Polish study asked its 1186 participants aged between 38 and 67 how often they felt sleepy and wanted to fall asleep in the daytime: 26.1% answered "often" but only 2.5% of the sample reported interference with their activities [15]. Another Japanese study reported that 15% of its nationally representative sample of 3030 participants (≥20 years of age) reported feeling "often" or "always" excessively sleepy during the daytime [16]. Martikainen *et al.* [17] found that 9.8% of their 1190 Finnish respondents, aged between 36 and 50 years, reported being "clearly more tired than others," experiencing a "daily desire to sleep in the course of normal activities" or feeling "very tired daily."

When using a frequency per week in a sample of European adults aged between 20 and 45 years, Janson *et al.* [18] obtained a prevalence of 20.6% of daytime sleepiness occurring at least 3 days per week and 5% of daily daytime sleepiness. Hublin *et al.* [19] found a 9% prevalence of daytime sleepiness occurring daily or almost daily in the Finnish twin cohort of 11 354 twins aged between 33 and 60 years. Ohayon *et al.* [20] used two definitions of sleepiness in a 5-country sample of 18 980 individuals aged 15 years and over. When asked if they had a tendency to fall asleep easily during the daytime and almost anywhere, 4% of the participants answered it occurred at least 3 days per

Table 1.2 Prevalence of excessive sleepiness in the general population

Authors	*N*	Age	Definition	Prevalence (%) (M/F)
Karacan *et al.* [53] Alachua county, Florida, USA, 1976	1645	≥18	Hypersomnia	0.3
Bixler *et al.* [1] Los Angeles, USA, 1979	1006	≥18	Sleep too much	4.2
Klink and Quan [8] Tucson, USA, 1987	2187	≥18	Falling asleep during the day	12.3/11.7
Ford and Kamerow [2] Baltimore, Durham, Los Angeles, USA, 1989	7954	≥18	Sleep too much lasting 2 weeks or more, and professional consultation, sleep-enhancing medication intake, or interferes a lot with daily life	2.8/3.5
Hays *et al.* [54] North Carolina, USA, 1996	3962	≥65	Frequent feeling of sleepiness during the day or evening that requires taking a nap	25.2
Enright *et al.* [9] Forsyth, Sacramento, Washington, Pittsburgh counties, USA, 1996	5201	≥65	Usually sleepy in the daytime	17.0/15.0
Foley *et al.* [11] Island of Oahu, Hawai, USA, 2001	2346 men	71–93	Usually sleepy in the daytime	7.7
Rockwood *et al.*, [12] Canada, 2001	1659	65–99	Tendency to sleep all day	3.9
Téllez-Lòpez *et al.* [4] Monterrey, Mexico, 1995	1000	≥18	— Getting too much sleep — Strong need to sleep during the day	9.5 21.5
Hara *et al.* [21] Bambui, Brazil, 2004	1066	≥18	Presence of sleepiness during the previous month, ≥3d/wk	16.8
Lugaresi *et al.* [7] San Marino, Italy, 1983	5713	≥3	Sleepiness independent of meal times	8.7
Gislason *et al.* [22] Uppsala, Sweden, 1987	3201 men	30–69	Moderate daytime sleepiness Severe daytime sleepiness	16.7 5.7
Liljenberg *et al.* [14] Gävleborg and Kopparberg counties, Sweden, 1988	3557	30–65	Daytime sleepiness often or very often	5.2/5.5
Martikainen *et al.* [17] Tampere, Finland, 1992	1190	36–50	— Consider themselves more clearly tired than others, or — Daily experience of desire to sleep during normal activities, or — Feel tired every day	9.8
Janson *et al.* [18] Reykjavik, Iceland Uppsala and Göteborg, Sweden, Antwerp, Belgium, 1995	2202	20–45	Daytime sleepiness ≥3 days/week	11–21
Hublin *et al.* [19] Finland, 1996	11/354	33–60	Daytime sleepiness every or almost every day	6.7/11.0
Asplund [55] Västerbotten and Norrbotten, Sweden, 1996	6143	≥65	— Often sleepy during the day — Often naps in daytime	32.0/23.2 29.4/14.4
Ohayon *et al.* (5) United Kingdom, 1997	4972	≥15	Feel sleepy during the day: A lot or greatly, ≥1 month Moderately, ≥1 month	 4.4/6.6 21.5/17.9

(*cont.*)

Table 1.2 (*cont.*)

Authors	*N*	Age	Definition	Prevalence (%) (M/F)
Nugent *et al.* [23] Northern Island, 2001	2364 men	≥18	Moderate daytime sleepiness (fall asleep when relaxing and sudden attacks of sleep or has to pull off the road while driving) Severe daytime sleepiness (fall asleep against their will)	8.0 11.8
Ohayon *et al.* [20] Germany, 2002	4115	≥15	— Tendency to fall easily asleep during the day ≥3 d/wk — Periods of sudden and irresistible sleep ≥3 d/wk — Feeling sleepy during the day — A lot or extremely — Moderately	7.8 9.0 3.2 13.0
Ohayon *et al.* [20] Italy, 2002	3970	≥15	— Tendency to fall easily asleep during the day ≥3 d/wk — Periods of sudden and irresistible sleep ≥3 d/wk — Feeling sleepy during the day — A lot or extremely — Moderately	0.8 1.6 1.5 4.5
Ohayon *et al.* [20] Portugal, 2002	1858	≥18	— Tendency to fall easily asleep during the day ≥3 d/wk — Periods of sudden and irresistible sleep ≥3 d/wk — Feeling sleepy during the day — A lot or extremely — Moderately	1.1 1.6 2.0 4.3
Ohayon *et al.* [20] Spain, 2002	4065	≥15	— Tendency to fall easily asleep during the day ≥3 d/wk — Periods of sudden and irresistible sleep ≥3 d/wk — Feeling sleepy during the day — A lot or extremely — Moderately	0.8 0.4 2.0 3.5
Ohayon and Vechierrini [24] France, 2002	1026	60–101	Tendency to fall easily asleep during the day ≥1 d/wk Feeling sleepy during the day — A lot or extremely — Moderately	5.3 5.2 6.0
Bixler *et al.* [25] Dauphin and Lebanon counties, Pennsylvania, USA, 2005	16/583	≥20	— Feeling drowsy or sleepy most of the day but manage to stay awake or Irresistible sleep attacks during the day	8.7
Takegami *et al.* [27] Hokkaido region, Japan 2005	4412	≥20	Epworth Sleepiness Scale	9.6/8.8

week. Periods of sudden and irresistible sleep during the daytime were occurring at least 3 days per week in 3.8% of the sample. They also observed important variations between the countries; southern European individuals being less sleepy than the others. Finally, a Brazilian study performed in Bambui with 1066 adult participants observed a prevalence of daytime sleepiness in the past month occurring at least 3 days per week in 16.8% of the sample [21].

The severity of excessive sleepiness was assessed with two different approaches. Some of the studies used a graduating scale ranging from "not at all" to "extremely" to evaluate the severity. Other studies have used the Epworth Sleepiness Scale (ESS).

In Europe, the Swedish study by Gislason and colleagues [22] yielded a prevalence rate of 16.7% for moderate daytime sleepiness and of 5.7% for severe daytime sleepiness in their male sample. Ohayon *et al.* [5] assessed daytime sleepiness on a severity scale in their UK sample of 4972 subjects aged between 15 and 101 years. Severe daytime sleepiness was observed in 5.5% of their sample, and moderate daytime sleepiness in 15.2%. A Northern Irish community study involving 2364 subjects aged between 18 and 91 years reported a prevalence of 19.8% of moderate or severe excessive sleepiness [23]. Ohayon and Vechierrini [24] reported that 6% of individuals 60 years and older living in the metropolitan area of Paris (France) had moderate sleepiness while 5.2% had severe sleepiness. Bixler *et al.* [25] assessed excessive daytime sleepiness in central Pennsylvania (USA) using two questions: "Do you feel drowsy or sleepy most of the day but manage to stay awake?" and "Do you have any irresistible sleep attacks during the day?" Moderate to severe answers to either one of these questions was considered indicative of excessive daytime sleepiness. Among the 16 583 participants aged 20 years and older, 8.7% had excessive daytime sleepiness.

Few studies have assessed the severity of sleepiness using the ESS. A Brazilian community study composed of 408 adults from Campo Grande city found a prevalence of 18.9% of participants with an ESS score of at least 11 [26]. In Poland, a study using a sample of 1186 individuals aged between 38 and 67 years reported excessive sleepiness in passive situations in 22.3% of the sample and excessive sleepiness in active situations in 0.7% [15]. Finally, a Japanese study of 4412 adults ($\geq$ 20 years) living in the Hokkaido region reported that 8.9% of the sample had abnormal ESS scores [27].

Some studies in the general population have compared different questions and types of assessment of excessive sleepiness [15, 20, 28]. A study in five European countries [20] measured excessive sleepiness using three definitions: (a) a tendency to fall easily asleep during the day occurring at least three days per week; (b) periods of sudden and irresistible sleep occurring at least three days per week; and (c) feeling sleepy during the day. Furthermore, there were small correlations between the questions: about 15% of the subjects reported positive answers on at least two of the questions. The three questions had moderate correlation between them (r between 0.22 and 0.35). Another study [28] showed that ESS scores correlated moderately with other subjective measures of excessive sleepiness (being sleepy during the daytime ($r = 0.36$) or being unrested during the daytime ($r = 0.24$)). These observations clearly indicate the multidimensionality of excessive sleepiness and also that it has only partly been assessed by current epidemiological studies.

Prevalence of sleep disorders characterized by excessive sleepiness

Three sleep disorders are characterized by excessive sleepiness and are divided into 12 diagnoses: hypersomnia, behaviorally induced insufficient sleep syndrome, and narcolepsy. Hypersomnia and behaviorally induced insufficient sleep syndrome are virtually undocumented in the general population.

The hypersomnia subtypes proposed by the latest ICSD have not yet been investigated in the general population. Some fragmentary information can be found in the Epidemiologic Catchment area study conducted in the 1980s, where a prevalence of 3.4% of hypersomnia was reported [2]. However, no differential diagnosis was done, which means that probably many subjects had instead another disorder, such as sleep-related breathing disorder or depression. Two general population studies reported a prevalence of hypersomnia diagnosis (all types) at 0.3% in the general population of the UK [5] and Italy [29].

The situation is not better for behaviorally induced insufficient sleep syndrome. Some epidemiologic surveys have investigated the association between sleep duration and excessive daytime sleepiness, but very few have explored the diagnosis. Indeed, mental disorders, organic diseases and other sleep disorders that could account for the sleepiness have to be ruled out before concluding to the presence of an insufficient sleep syndrome. For example, in the Finnish twin cohort, Hublin *et al.* [30] defined insufficient sleep as a difference of at least one hour between reported nocturnal sleep duration and reported needs of sleep; 20.4% of their sample met this criterion. Of these subjects, about 40% reported daytime sleepiness at least 3 days per week, which means that about 8% of their sample had both insufficient sleep and excessive daytime sleepiness. Yet, differential diagnosis is not applied. Based on the data provided by the authors, half of these subjects with insufficient sleep also had insomnia symptoms and 40% were depressed according to the Beck Depression Inventory (BDI). There were no data on possible sleep apneas. Therefore,

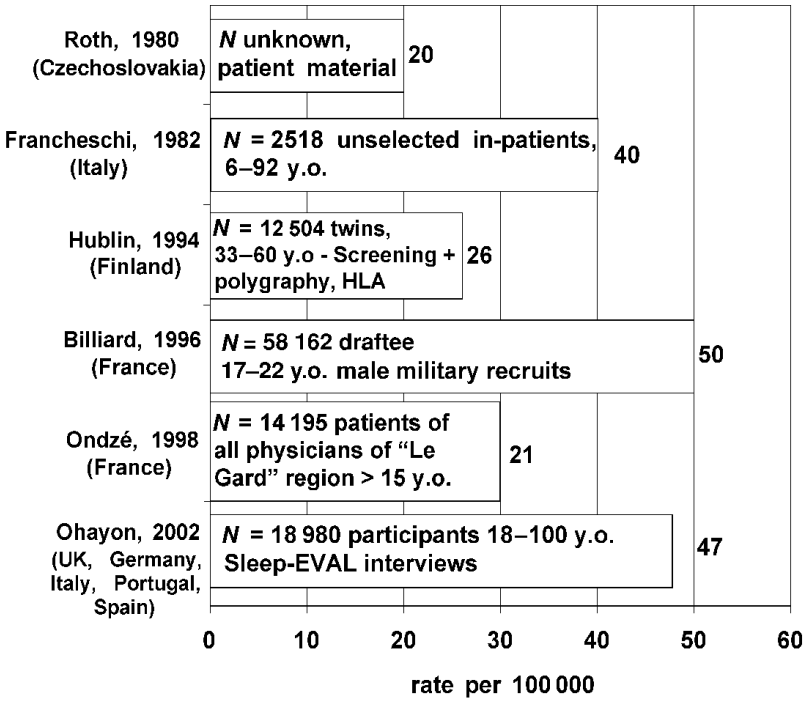

Figure 1.1 Prevalence of narcolepsy in Europe.

insufficient sleep syndrome was likely to be lower than 4% in that sample. Another study, conducted in Japan [16], evaluated insufficient sleep by asking subjects if they got as much sleep as they needed. A total of 23.1% answered negatively to that question, of which 31.3% had daytime sleepiness. Consequently, the combination of insufficient sleep and daytime sleepiness was present in about 7.2% of their adult sample. Again, no differential diagnosis was applied. One study conducted in the UK [5] applied strict differential diagnosis and found a prevalence of insufficient sleep syndrome at 1.1% in their sample.

Narcolepsy, although very rare, has received greater attention. However, reliable estimates of narcolepsy in the general population are difficult to achieve. It requires scanning a large number of individuals to obtain sufficient precision in the prevalence. Consequently, most of the studies have extrapolated the prevalence of narcolepsy to the general population using clinical samples, specific community groups or advertisements. Only three studies calculated the prevalence of narcolepsy in samples representative of the general population. According to these studies, the prevalence varies from 20 to 67 per 100 000 inhabitants in Europe (Figure 1.1) [29, 31–35] and North America (Figure 1.2) [36–39]. In Asian countries (Figure 1.3), a study performed in Japan set this rate at 590 per 100 000 inhabitants [40], and another Japanese study set this rate at 160 per 100 000 inhabitants [41]. In Hong Kong, this prevalence was estimated to be between 1 and 40 narcoleptics per 100 000 inhabitants [42]. Another study performed with Jews in Israel, a population known for its low rate of human leukocyte antigen (HLA-DR2), a predisposing marker for narcolepsy, set the prevalence at 0.23 per 100 000 inhabitants [43].

Among the studies based on representative general community samples, the oldest study was performed in Saudi Arabia [44]. Nearly all inhabitants, aged 1 year or older, of the Thugbah community were interviewed. A total of 23 227 individuals participated in face-to-face interviews. A neurologist subsequently evaluated all participants with abnormal responses in the questionnaire. Narcolepsy was found in 40 per 100 000, 0.04% of the sample (95% confidence interval, 0.014–0.066%).

A study [20] was conducted with representative samples of five European countries (the UK, Germany, Italy, Portugal and Spain). A total of 18 980 individuals, aged 15 years and over, were interviewed by telephone. Using the minimal criteria proposed

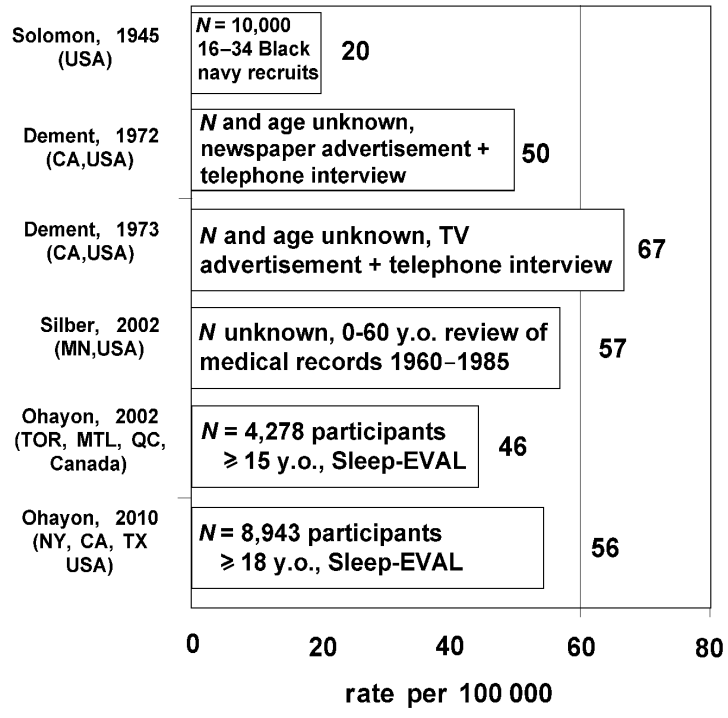

Figure 1.2 Prevalence of narcolepsy in North America.

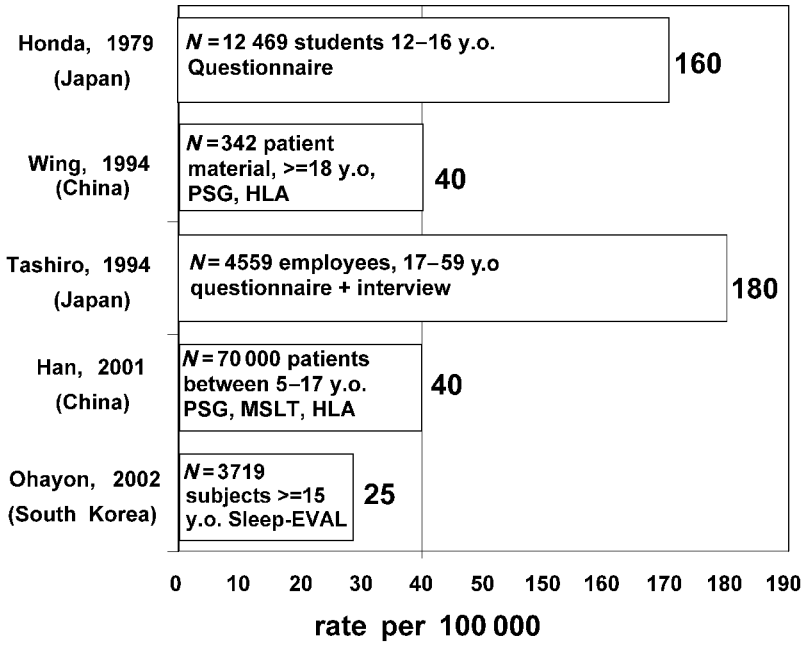

Figure 1.3 Prevalence of narcolepsy in Asia.

by the International Classification of Sleep Disorders (ICSD), a prevalence of narcolepsy of 47 per 100 000, 0.047% (95% confidence interval, 0.016–0.078%) was observed.

Wing *et al.* [45] conducted a telephone study using a general population sample of 9851 adults aged between 18 and 65 years. Participants answered a validated Chinese version of the Ullanalina

Narcolepsy Scale. Subjects with positive scores on the Ullanalina Narcolepsy Scale ($n = 28$) were invited to a clinical interview and further testing (polysomnography, MSLT and human leukocyte antigen (HLA) typing). Three subjects refused supplemental evaluation. Three subjects were identified as narcoleptics. This sets the prevalence of narcolepsy at 34 per 100 000, 0.034% (95% CI: 0.021–0.154%) in Hong Kong.

Limitations from existing classifications pose serious difficulties in studying narcolepsy in the general population. The use of too large criteria inflates the prevalence. For example, the narcolepsy symptoms (automatic behavior, sleep paralysis and hypnagogic hallucinations) are too poorly defined to be useful in epidemiology. Recurrent intrusions of elements of REM sleep into the transition between sleep and wakefulness are highly prevalent in the general population: 6.2% for sleep paralysis and 24.1% for hypnagogic hallucinations [20]. This indicates that these symptoms are not specific to narcolepsy.

Relationship with cognitive deficits and mortality

Two epidemiological studies have linked excessive sleepiness to cognitive deficits. In a study involving 2346 Japanese-American men aged between 71 and 93 years, Foley *et al.* [11] found that men who reported excessive sleepiness at baseline were twice as likely to be diagnosed with dementia three years later than those without daytime sleepiness. In another study involving 1026 subjects aged 60 years or older, Ohayon and Vechierrini [24] found that after controlling for age, gender, physical activity, occupation, organic diseases, use of sleep or anxiety medication, sleep duration and psychological well-being, subjects with excessive sleepiness were twice as likely to have attention–concentration deficits, difficulties in orientation and memory problems than did the others.

Some general population studies have investigated the mortality risks associated with excessive sleepiness. The study of Hays *et al.* [46] assessed mortality risks in a sample of 3962 elderly individuals (65 years and older). In that study, excessive sleepiness was defined by the presence of naps during the daytime. They found that individuals who reported napping most of the time had a mortality risk of 1.73.

Another study [12] found a small increased mortality risk (1.89) from daytime sleepiness in their elderly sample. However, this risk was non-significant when they adjusted the model for age, depression, cognitive deficits, and illness.

Factors associated with excessive sleepiness

Unlike insomnia symptoms, excessive sleepiness is generally not gender-related. Whether its prevalence increases or decreases with age is not clear, as both trends have been observed [4, 20, 22, 23].

Excessive sleepiness can be caused by various factors such as poor sleep hygiene [5, 19], work conditions [5], and psychotropic medication use [5, 19, 23].

Excessive sleepiness has been found to be associated also with sleep-disordered breathing [5, 18, 19, 23], psychiatric disorders, especially depression [2, 3, 5, 19, 23], and physical illnesses [5, 18, 23].

Conclusions

From these epidemiological studies, it is clear that a uniform operational definition of excessive sleepiness is still missing. None of these epidemiological studies used a standardized questionnaire to assess daytime sleepiness. Worst, excessive sleepiness was mostly evaluated on the basis of a single question, which was formulated differently from one study to the other. In such circumstances, it is difficult to reach any definite conclusions.

Excessive sleep quantity is an associated symptom in depressive disorders in the DSM-IV classification. However, no epidemiological study has investigated such a relationship, even though mental disorders are present in about 10% of sleepy individuals who consult in sleep disorders clinics; between 10 and 75% of depressed patients complain of sleeping too much. Few polysomnographic studies have been performed with patients having a mood disorder in relationship to excessive sleep quantity or excessive sleepiness. The Multiple Sleep Latency Test (MSLT) did not reveal abnormalities in the daytime sleep latency [47]. Several clinical studies have also pointed out the high occurrence of subjective excessive sleepiness in association with mental disorders, organic disorders, or both. This high comorbidity may hide a more complex problem based on the definition of excessive sleepiness.

For now, only the Multiple Sleep Latency Test (MSLT) objectively measures excessive sleepiness and is considered the gold standard. The MSLT, however,

must be administered in a sleep laboratory, therefore limiting its uses in epidemiological studies unless a subsample is invited to perform this examination in a sleep laboratory. Consequently, it is very highly desirable that a self-administered questionnaire be developed in order to assess excessive sleepiness. If it is done, however, it should be kept in mind that we would pass from an objective measure to a subjective measure of excessive sleepiness. One of the most commonly used self-administered sleepiness scales is the Epworth scale [48]. Unfortunately, studies that measured the agreement between this scale and MSLT revealed a poor agreement between them [49].

Few of the epidemiological studies have reported results by ethnic group, or indicated the ethnic makeup of their sample. In fact, there have been almost no data published on ethnocultural differences in excessive sleepiness in the USA or elsewhere [20, 50]. Some investigators have interpreted data from the Human Relations Area Files as indicating that certain aspects of sleep, such as daytime napping may occur more in some cultural groups [51], but epidemiologic data on such cross-cultural differences are actually quite rare. A recent study of college students in Mexico City found no support for the "siesta culture" concept, characterized by a strong tendency for daytime naps and daytime sleepiness [52]. More similarities than differences were noted between the sample from Mexico and samples from other countries on sleep patterns.

In summary, there are yet several areas that need to be clarified regarding excessive sleepiness in the general population. First, an operational definition needs to be developed so that it can be used in general population studies. Once the agreement is made on the definition of excessive sleepiness and the criteria necessary to confirm its presence, several questions would still remain: how can we differentiate daytime sleepiness from fatigue? To what extent do these two concepts overlap? Is daytime sleepiness always a cause of fatigue, or can daytime sleepiness occur without fatigue? To what extent can subjective daytime sleepiness assessment be compared with objective daytime sleepiness assessment? How can we distinguish between the different causes of excessive sleepiness?

Acknowledgments

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