Descriptive Epidemiology of Excessive Daytime Sleepiness

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Methodologic Considerations

Daytime sleepiness is the common experience of the tendency to sleep during the daytime. When this phenomenon is not invalidating, is justified by lifestyle and is sporadic, it may be considered a normal expression of our needs. If, however, the tendency to fall asleep during the day becomes excessive, undesired, inappropriate, disturbing and persistent, it becomes pathologic and may be referred to as excessive daytime sleepiness (EDS) [1-3]. EDS is being studied with increasing interest, since it is indicative of several diseases and has major familial and social effects.

The subjective experience of EDS can be identified by the “Multiple Sleep Latency Test” (MSLT), which provides quantitative and qualitative information on the tendency to sleep during the daytime [2, 4-6]. As this test cannot be used on large samples of the general population for reasons of cost and time, the descriptive epidemiology of EDS must of necessity rely on questionnaires where the presence or absence of the symptom is investigated. The use of different questions in the questionnaire, even if they resemble each other, can give rise to differences in the answers. This highlights the importance of the linguistic aspect and of the difficulty of translating definitions into other languages [7-9]. Moreover, a question about a symptom, and not about a specific disease, inevitably introduces variables linked to personal experience, education and the impact of the disturbance on the familial and social environment.

The questionnaire should therefore be prepared bearing these points in mind so as to satisfy the criteria of intelligibility, reproducibility and validity [10]. The validation will disclose the sensitivity and specificity of the questions employed against the test considered diagnostic of the phenomenon under investigation (in this case the MSLT) and is necessary to establish the reliability of the screening tool and hence the results obtained [11]. In addition to a clear explanation of how to prepare the questionnaire, the modality of its administration and, in the case of interviews, the type of training for interviewers should both be shown. Finally, the type of population on which the survey is to be carried out must be specified,

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as well as the way the sample is to be obtained, the participation rate and the characteristics of non-participants. Only by satisfying all these points, will it be possible to compare and generalize the results.

Bearing these guidelines on descriptive epidemiology in mind, we reviewed the literature on the prevalence of EDS in the general population and investigated the phenomenon in the city of Bologna.

**Review of the Literature**

We considered the descriptive epidemiologic studies of EDS on non-selected samples of the general population [12-19], also including two surveys which excluded elderly subjects [20, 21]. Moreover, studies carried out on a single sex [22-26] or age group [8, 22-36] were examined, as long as the criteria of non-selection was assured. In some studies the prevalence rate was not calculated, as this was not part of the principal aims of the study, but it was obtainable from other results reported [12, 25, 29, 30, 32]. Studies carried out on selected populations were excluded, such as volunteers, certain groups of workers, subjects undergoing regular medical check-ups and in-patients.

The studies examined reported widely differing prevalence rates of EDS in the general population (varying from 0.3 to 36%). This wide variability of rates is probably due mainly to the use of inhomogeneous methodologic criteria, such as the definition of EDS, the way of gathering the data and the type of population studied [37]. These points will be analyzed one by one.

**Definition of EDS**

The difference between the definitions used in questionnaires is the first point to be considered. In some studies the subjective experience of EDS is explored, employing questions with phrases such as "feel sleepiness/feel sleepy" [8, 14, 22, 25, 27, 34], "feel tired" or "with a compulsive desire to sleep" [28], "struggling to stay awake" [27, 33], "being so sleepy that you have to take a nap" [31, 36]. Other questionnaires study the objective consequences of EDS, i.e. the occurrence of falling asleep during the day in a non-physiologic way, and use definitions such as "the excessive tendency to fall asleep" [20], "being troubled by falling asleep" [15], falling asleep "when you did not intend to" [17], or falling asleep "against your will", "where you do not want to", "even if you don't want to, you can't help it" [25, 30, 35], or in different situations [18, 25, 33]. Broman et al. [21] define EDS by the concomitant presence of the subjective experience of "sleepiness" and of "involuntary falling asleep" during the day. Because of the difficulties to find the best word to indicate EDS and to avoid overestimating the phenomenon, Billiard et al. [23] looked for "daytime sleep episodes", considering them as the culminating expression of sleepiness. "Sleeping too much" and "too much sleep", without a defined reference to events/experiences during the day, were investigated by Karacan et al. [12], Bixler at al. [13], and Ford and Kamerow [16]. However, we underline that questions on "sleep episodes" and "sleeping too much/too much sleep" did not strictly investigate the EDS.