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Lifetime Prevalence Rates of Sleep Paralysis: A Systematic Review

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Abstract

Objective—To determine lifetime prevalence rates of sleep paralysis.

Data Sources—Keyword term searches using “sleep paralysis”, “isolated sleep paralysis”, or “parasomnia not otherwise specified” were conducted using MEDLINE (1950-present) and PsychINFO (1872-present). English and Spanish language abstracts were reviewed, as were reference lists of identified articles.

Study Selection—Thirty five studies that reported lifetime sleep paralysis rates and described both the assessment procedures and sample utilized were selected.

Data Extraction—Weighted percentages were calculated for each study and, when possible, for each reported subsample.

Data Synthesis—Aggregating across studies (total N = 36533), 7.6% of the general population, 28.3% of students, and 31.9% of psychiatric patients experienced at least one episode of sleep paralysis. Of the psychiatric patients with panic disorder, 34.6% reported lifetime sleep paralysis. Results also suggested that minorities experience lifetime sleep paralysis at higher rates than Caucasians.

Conclusions—Sleep paralysis is relatively common in the general population and more frequent in students and psychiatric patients. Given these prevalence rates, sleep paralysis should be assessed more regularly and uniformly in order to determine its impact on individual functioning and better articulate its relation to psychiatric and other medical conditions.

Keywords

sleep paralysis; isolated sleep paralysis; anxiety; fear; parasomnia; prevalence

Sleep paralysis (SP) is characterized by a discrete period of time during which voluntary muscle movement is inhibited, yet ocular and respiratory movements are intact and ones sensorium remains clear (1). These episodes can occur when falling asleep or upon

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awakening, and are most likely to happen when individuals sleep in a supine position (2). Some of the more notable aspects of SP are the vivid hypnogogic (sleep onset) or hypnopompic (sleep offset) hallucinations that often accompany episodes. These potentially frightening experiences have been interpreted in a number of culturally-specific contexts, with variegated spiritual and supernatural explanations ranging from witchcraft and malevolent spirits to extra-terrestrials (3). Contemporary medical explanations for the genesis of SP are not so colorful, with sleep studies locating SP's genesis in a perseveration of REM activity into normal sleep transitions (1).

Episodes of SP have been linked with conditions such as narcolepsy, hypertension, and seizure disorders, but are also associated with a general lack of sleep, sleep disturbances, jet lag, student status, African descent, and shift work (4-6). When SP occurs in otherwise healthy individuals it is termed isolated SP. Neither SP nor isolated SP episodes are currently recognized as codable diagnoses. However, the International Classification of Sleep Disorders 2nd Edition (1) includes recurrent isolated SP as a diagnostic possibility, and these same symptoms could be classified as a parasomnia not otherwise specified in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV)(7).

Fear and SP

SP episodes are often experienced as frightening. Cheyne et al. (8) found that 90% of a student sample and 98% of a web-based sample reported fear, and clinically significant levels of fear were found in 69% of Sharpless et al.'s (9) psychiatric sample. These high rates of fearfulness are in contrast to the relatively lower rates experienced during normal dreaming, where it occurs approximately 30% of the time (10).

The fear associated with SP appears to arise not only from individual reactions to atonia, but from the hallucinatory content as well (2,11). Unnatural involuntary movements (e.g., levitation), autoscopy, the presence of malevolent intruders in the bedroom, and physical/sexual assaults are common SP hallucination themes (8). A patient's construal of SP hallucinations may lead them to present for treatment in a disoriented and acutely fearful manner, and there are reports in the literature of such patients being misdiagnosed with a psychotic disorder (12). Regardless, the distressing nature of SP potentially places it within the realm of psychopathology and, indeed, preliminary links between the two have been made.

SP and Psychopathology

Along with the above-mentioned relationship to narcolepsy and other medical conditions, several lines of evidence imply that SP may be related to certain psychiatric disorders. SP has been associated with dissociative phenomena (13), but it has probably been most frequently assessed within the context of the anxiety disorders in general (6) and with panic disorder (14) and post-traumatic stress disorder (9,15) in particular. Elevated rates of anxiety sensitivity have also been found in individuals with SP (9,16), and this is consistent with several early reports (17-18) hypothesizing links between SP and general negative affect/trait neuroticism. More broadly, and consonant with the above, evidence exists that stress, chronic fear, and anxiety may serve as predisposing factors making the occurrence of SP more likely (19).

In spite of its potentially distressing nature and promising links with various types of psychopathology, SP is not widely assessed in either basic psychiatric research or clinical trials, and major clinical diagnostic interviews typically used in both types of research (e.g., Structured Clinical Interview for DSM-IV [20]; Anxiety Disorders Interview Schedule [21]) do not contain modules for its assessment. Therefore, it is perhaps not surprising that the

lifetime prevalence of SP is not well-known. In many available SP resources (1), only ranges of prevalence rates culled from several larger studies are typically provided. Further, our own search of the literature revealed no large scale reviews of SP prevalence rates. This lack of clear prevalence data may lead clinicians and researchers alike to overlook SP phenomena.

Present Study

The objective of the present study is to comprehensively survey the available literature in order to calculate lifetime prevalence rates for certain subgroups. We predict that rates of SP will be lower in general population samples than in student samples, and that the highest rates will be found in psychiatric patients. We also predict that lifetime rates of SP will be higher in individuals of African descent. Exploratory analysis of SP rates according to gender will also take place. However, as there appear to be contradictory findings in the literature, we make no specific prediction.

Method

A key word literature search of “sleep paralysis,” “isolated sleep paralysis,” and “parasomnia not otherwise specified” was conducted using MEDLINE (1950-present) and PsycINFO (1872-present) databases on May 1st, 2010. MEDLINE yielded 314 abstracts and PsychINFO yielded 370. All English and Spanish language abstracts were initially examined by the first author. Additional searches through the reference lists of identified articles also took place, and two additional articles were suggested by a reviewer. Of these, a total of 39 studies were identified that reported lifetime SP prevalence data, described the measures and procedures used to make a determination of SP, and described their samples in at least some detail. These articles were examined independently by the second author, and any disagreements were resolved through consensus. Of these 39, a total of 4 articles were excluded for reasons such as low return rate (i.e., less than 25%) of surveys (n = 1), idiosyncratic definitions of SP not congruent with International Classification of Sleep Disorders (1) criteria (n = 1), and inability to determine the presence of individual episodes of SP (n = 2) due to the fact that only recurrent SP rates were reported. If demographic or other information was unclear or not provided in the article, efforts were made to contact all first authors via email. We received 4 clarifications.

Results

The 35 articles included in the analyses can be found in Table 1. They span 5 decades of research and represent a truly international and cross-cultural sample. Regarding assessment modality, self-report measures were clearly favored, and were used in 68.6% of the studies.

Overall SP Prevalence Rates

As is evident in Table 1, lifetime prevalence rates of SP vary widely according to sample/subsample and range from 1.5% (32) to 100.0% (22). Collapsing across all studies, approximately one fifth of the 36533 persons assessed experienced at least one episode of SP (Table 2).

SP in General Population, Student, and Psychiatric Patient Samples

As predicted, general population SP rates were lower than students, and student rates were slightly lower than psychiatric patients (Table 2). Given that the clinical sample allowed for a subgoup analysis of panic disorder patients (but unfortunately not for other specific

diagnoses), we found that panic patients evidenced the highest overall rates of any of the preceding groups.

SP and Ethnicity

Although differences in reporting and small Ns for certain subgroup analyses were evident, lifetime SP prevalence rates according to ethnicity are presented in Table 3. Somewhat surprisingly, it was not possible to attain population estimates of Caucasians due to the fact that percentages were not reported and/or only mixed ethnicity samples were described. In student and psychiatric samples, minority patients reported higher rates of lifetime SP than Caucasians. Overall, rates of SP for the general population and psychiatric samples were highest for those of African descent, and those of Asian descent evidenced the highest rates in student samples.

Gender and SP

Gender data for 15479 participants was available (8148 women). Collapsing across studies and groups, slightly more women (18.9%) experienced lifetime SP than men (15.9%).

Age and SP

Given the difference in lifetime rates of SP between students and the general population, we had hoped to examine if age differences may be a contributing factor. However, due to the great variability in reporting the age of samples, especially in the general population studies (e.g., only two studies reported statistics for ranges, means, and standard deviations, and many listed only fairly wide age ranges), this was not possible. Nevertheless, 6 of the 35 total studies assessed for age differences between those with and without lifetime SP, but none reported significant results.

Discussion

In conclusion, we have reviewed the available literature on lifetime episodes of SP and have found it to be a fairly common experience. Although occurring in less than 8.0% of the general population, it is much more frequent in students and psychiatric patients, and the difference between these latter two groups is surprisingly small. Reasons for these higher prevalence rates are unclear, but it is possible that both groups experience regular sleep disturbances, a factor making SP episodes more likely (2).

One research implication of these findings is that students may be a good population to study SP, as they are typically more accessible to academic researchers than psychiatric samples. However, it remains an open question whether or not relative frequency, severity, and clinical interference of SP differs between the two groups.

SP also appears to be more frequent in minority populations than Caucasians. However, caution must be exercised in interpreting these results, as several of the subgroup analyses listed in Table 3 were relatively small, and some subgroup analyses (e.g., general population Caucasians) were impossible to conduct with the available data. A similar difficulty with regard to age was evident as well, but it is interesting to note that no individual study found a siginificant relationship between age and SP status. We recommend a more thorough and uniform reporting of important demographic information when conducting future studies with especial attention devoted to ethnic breakdowns of prevalence rates.

Clinically, one implication of these findings is that SP should be more regularly assessed, especially in the populations found to have relatively elevated rates of occurrence. Along with broadening the symptomatic picture of patients, several existing studies have noted the

clinical relief patients may feel as a result of providers normalizing SP experiences (6,9). Beyond this, treatments for SP are currently not well articulated, and it remains unclear whether existing treatments (e.g., cognitive behavioral therapy, pharmacotherapy, improving sleep hygiene) may be useful, or whether SP-specific interventions are required.

There are several noteworthy limitations to this review. Given the wide variability in SP measures used and their thoroughness, it is unclear how many individuals' SP experiences occurred in the context of narcolepsy or another medical condition (e.g., seizure disorder, alcohol intoxication). Thus, it is impossible to determine how many people experienced *isolated* SP. The percentage of individuals who experienced SP as a distressing or interfering experience is also relatively unknown. In one clinical sample (9) the majority of individuals who reported SP endorsed clinically significant distress and/or interference. However, as some individuals' experience of SP includes pleasant sensations and hallucinatory content (2), the extent to which SP occurs in a clinically-significant manner remains relatively unknown. Regardless, given the relatively high lifetime prevalence rate of SP, we believe that additional attention is warranted from researchers and clinicians alike.

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Glossary

Abbreviations

SP	sleep paralysis
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th Edition

Glossary of Terms

Anxiety Sensitivity	refers to the tendency to fear anxiety-related symptoms (e.g., tachycardia perspiration) due to a belief that they will eventuate in a negative social or health-related outcome.
Autoscopy	is the experience of seeing oneself from a position outside of one's own body
Negative Affect	refers to the broad predisposition/personality trait to experience negative mood states. Negative affect (trait neuroticism) is believed to be a shared commonality between the anxious and depressive disorders.

Table 1

Published Lifetime Prevalence Rates of Sleep Paralysis

Citation	Date	Sample N	% SP	Assessment Modality	Sample Type	Ethnicity
Abrams et al. (22)	2008	216	62.0	SR	G, S	Caucasian American
		5	100		G, S	African American
		21	71.7		G, S	Asian Americans
		3	66.7		G, S	Hispanic Americans
Arikawa et al. (23)	1999	720	33.9	SR	G	Japanese
Awadalla et al. (24)	2004	527	28.8	SR	S	Kuwaiti
		762	29.9		S	Sudanese
		649	24.5		S	American
Bell et al. (25)	1984	36	38.9	Int	G	African American
		72	41.7		C	African American
Bell et al. (26)	1988	31	41.9	Int	G, High BP	African American
Cheyne et al. (8)	1999	870	29.2	SR	S	Canadian
Cheyne et al. (27)	1999	1273	28.3	SR	S	Canadian
Dahmen et al. (28)	2002	128	2.35	Int	G	German
Everett (29)	1963	52	15.4	SR	S	American
Fukuda et al. (30)	1987	635	43.0	SR	S	Japanese
Fukuda et al. (31)	1998	149	38.9	SR	S	Japanese
		86	41.9		S	Canadian
Goode (32)	1962	67	1.5	SR	G	American
		284	5.3		S	American
		8	12.5		C	American
Huamani et al. (33)	2006	104	55.8	SR	S	Peruvian
Hufford (5)	2005	254	16.5	Int	G	American
Jimenez-Genchi et al. (34)	2009	322	27.6	SR	S	Mexican
Kotorri et al. (35)	2001	8162	39.6	SR	G, S	Japanese
Lopez et al. (36)	1995	1000	11.3	SR	G	Mexican
McNally & Clancy (13)	2005	16	12.5	SR	G	American

Citation	Date	Sample N	% SP	Assessment Modality	Sample Type	Ethnicity
		68	45.5		C	American
Neal et al. (37)	1994	18	38.9	Int	C	African American
Ohaeri et al. (38)	1989	164	26.2	SR	S	Nigerian
Ohaeri et al. (39)	1992	95	44.2	SR	S	Nigerian
Ohayon et al. (15)	2000	1832	2.4	Int	G	Canadian
Ohayon et al. (40)*	2002	14008	6.2	Int	G	Spanish, German, Italian, Portuguese
Otto et al. (6)	2006	61	19.7	SR	C	American
Paradis et al. (41)	2009	208	25.0	SR	S	American
Penn et al. (42)	1981	80	16.3	SR	S	American
Sharpless et al. (9)	2010	23	47.8	Int	C	African American
		3	33.3		C	Asian American
		97	22.7		C	Caucasian American
		7	57.2		C	Hispanic American
Simard & Nielson (19)	2005	434	30.4	SR	S	Canadian
Smith et al. (43)	1999	43	48.8	Int	C	African American
		28	25.0		C	Caucasian American
Smith et al. (44)	2008	50	40.0	SR	G	African American
Spanos et al. (45)	1995	1798	21.5	SR	S	Canadian
Suarez (14)	1991	30	20.0	Int	G	Spanish
		60	40.0		C	Spanish
Wing et al. (46)	1994	603	37.0	SR	S	Chinese
Wing et al. (47)	1999	158	17.7	SR	G	Chinese
Yeung et al. (48)	2005	42	26.2	Int	C	Chinese American
		150	23.3		C	Chinese

Note: SP = sleep paralysis; G = general population; S = students, C = clinical psychiatric patients; SR = self-report; Int = interview; BP = blood pressure; "*" = data used in our gender calculations were initially reported in a previous manuscript (49).

Table 2
Lifetime Prevalence Rates of Sleep Paralysis by Sample Type

Sample	Sample N	% with SP
All Studies	36533	20.8
General Population	18330	7.6
Students	9095	28.3
Psychiatric Patients	683	31.9
Patients with Panic Disorder	318	34.6

Note: SP = sleep paralysis; Patients with Panic Disorder is a subset of the Psychiatric Patient sample category.

Table 3
Lifetime Sleep Paralysis Prevalence Rates by Sample Type and Ethnicity

Sample Type	Ethnicity	Sample N	% with SP
General Population	African	117	40.2
	Asian	878	31.0
	Caucasian	--	--
	Hispanic	1000	11.3
Students	African	1002	31.4
	Asian	1387	39.9
	Caucasian	613	30.8
	Hispanic	426	34.5
Psychiatric Patients	African	158	44.3
	Asian	195	24.1
	Caucasian	125	23.2
	Hispanic	*	57.1
Total	African	1282	34.1
	Asian	10643	38.7
	Caucasian	954	36.9
	Hispanic	1436	18.5

Note: Total N is discrepant from previous table due to a lack of uniform reporting across samples;

"*"
= N < 10.