

## High Prevalence of Isolated Sleep Paralysis: *Kanashibari* Phenomenon in Japan

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**Summary:** In Japan, a set of experiences called *kanashibari* is considered identical with isolated sleep paralysis. We investigated this phenomenon by means of a questionnaire administered to 635 college students (390 men and 245 women). Of all subjects, about 40% had experienced at least one episode of *kanashibari* [subjects of K(+)]. Therefore, isolated sleep paralysis is apparently a more common phenomenon than is usually appreciated. About half of the subjects of K(+) reported that they had been under "physical or psychological stress" or in a "disturbed sleep and wakefulness cycle" immediately before the episode. Many subjects of K(+) experienced the first episode in adolescence. In the distribution of age of first attack, the peak occurred at an earlier age in women subjects than in men subjects. These findings suggest that two factors influence the occurrence of the phenomenon. One is exogenous physical or psychological load and the other is endogenous biological development. **Key Words:** Kanashibari attack—Isolated sleep paralysis—Normal human.

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Sleep paralysis has usually been described in terms of its association with narcolepsy. Indeed, it is considered one of the components of the narcolepsy tetrad (i.e., sleep attack, cataplexy, sleep paralysis, and hypnagogic hallucinations). Although sleep paralysis is frequently associated with other narcoleptic syndromes, it also occurs independently, without sleep attack or cataplexy, in otherwise healthy individuals. In *Diagnostic Classification of Sleep and Arousal Disorders* (Association of Sleep Disorders Centers, ASDC) (1), this isolated form of sleep paralysis is classified as "familial sleep paralysis" (3). This work quotes from an article by Goode (2), who found that 4.7% of normal respondents had experienced isolated sleep paralysis, and suggests that this figure is overestimated. There are some case reports of isolated sleep paralysis (3-9), but few epidemiological studies of this phenomenon. In Everett's study (10), 15.4% of the 52 respondents had experienced isolated sleep paralysis. Recently, Penn et al. (11) found such sleep paralysis in 16.3% of 80 college students.

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Accepted for publication November 1986.

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On the other hand, in Japan, a set of psychological and physical experiences exists involving paralysis, usually with terror or anxiety and with or without hallucinations, during the transitional period between sleep and wakefulness. These experiences have traditionally been interpreted broadly in Japan as a phenomenon called *kanashibari* that must be symptomatically identical to isolated sleep paralysis. The etymology of the term *kanashibari* derives from the homonym, which means the magic of *Fudoh-Myohoh*, one of the gods of Buddhism. Long ago in Japan, Buddhist monks were thought to use the magic to paralyze others as if binding them with chains. Many Japanese suspect that evil spirits cause the phenomenon, and there are very few scientific studies of it.

The purposes of this article are to report the results of an investigation of this phenomenon by means of a questionnaire and to reevaluate isolated sleep paralysis.

### METHODS

A questionnaire relating to *kanashibari* experience was administered to 635 college students (390 men and 245 women), who ranged in age from 18–26 years (mean 19.6 years).

The questionnaire contained the following questions: (a) Have you ever heard of the term *kanashibari*? (b) Do you suspect a relation between *kanashibari* and spirits (or supernatural power)? (c) Have you ever experienced *kanashibari*—while lying fully conscious or half asleep, with or without hallucinations, did you ever find that you could not move or speak? (d) How often have you experienced *kanashibari*? (e) At what age did you have the first episode of *kanashibari*? (f) What was your physical and psychological condition preceding the episode(s)? (g) Choose symptoms of your *kanashibari* episode(s). (h) Have you ever experienced sudden weakness of body muscles while awake, occurring either with laughter or anger or when startled or feeling exhilarated? (i) Have you ever experienced hypersomnolence in a very strained situation, e.g., driving a car or taking an exam, despite normally adequate amounts of nocturnal sleep? Subjects were required to answer by checking items in each question.

### RESULTS

Of all subjects, 98.4% had heard of the term *kanashibari*, and of those, 46.0% of men and 70.8% of women answered in the affirmative (“yes” or “perhaps yes”) to the question on the relation between *kanashibari* and spirits.

As shown in Fig. 1 (top), 37.7% of all men and 51.4% of all women (total 43.0%) had experienced at least one episode of *kanashibari* attack [subjects of K(+)]. A sex difference is related to the incidence of *kanashibari* ( $\chi^2 = 11.584$ ,  $df = 1$ ,  $p < 0.001$ ). Figure 1 (bottom) shows the distribution of the frequency of attacks. Of subjects of K(+), 83.2% reported these attacks as occurring not more than “several times in a lifetime”; however, two women subjects reported having them “almost every day.”

Figure 2 shows details of the symptoms of these attacks. In answering this question, subjects were allowed to check more than one item.

For question f (physical and psychological condition immediately before the attack), subjects were also allowed to check more than one item. Among the other items were the responses “same as usual” and “do not remember.” It is contradictory to choose one of these responses and the other responses at the same time because other responses describe unusual conditions. Some subjects, however, checked these exclu-

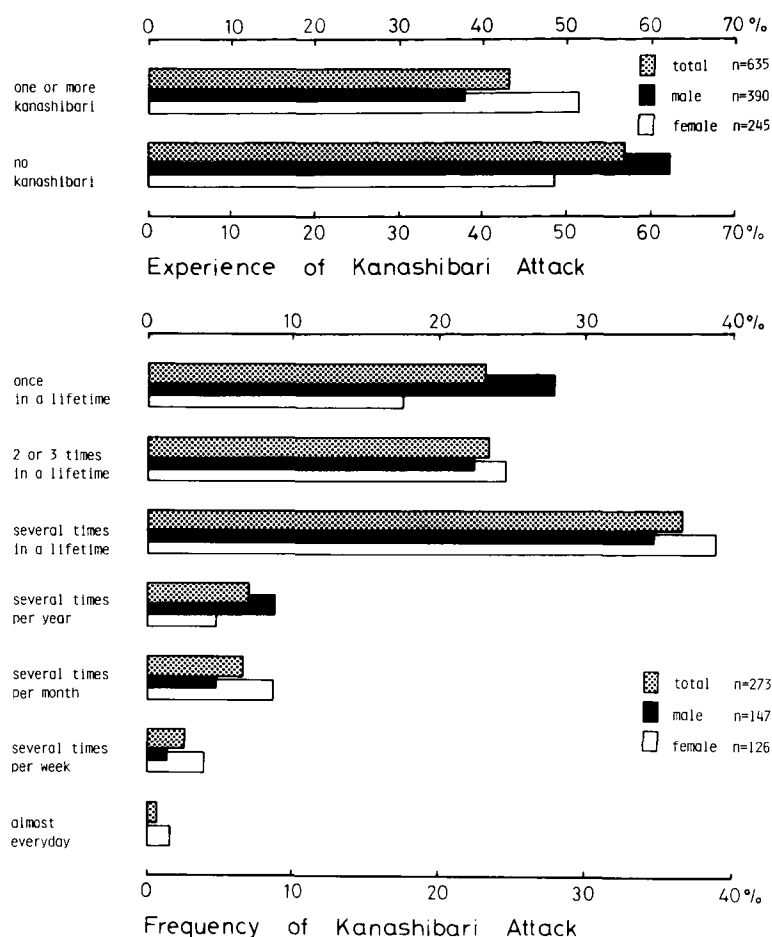


FIG. 1. Experience and frequency of episodes of *kanashibari* attack.

sive responses ("same as usual" and "do not remember") and other responses as well. When we eliminated these answers from the investigation of the condition preceding the episodes, 234 subjects remained. Figure 3 shows the condition of subjects preceding the episodes. Of the subjects remaining, 26.5% checked "do not remember," 23.1% checked "same as usual," and 50.4% checked other responses (i.e., unusual conditions). The answers concentrated on the four responses: "tired," "psychological stress," "irregular life pattern," and "sleep loss."

Figure 4 shows the distribution of subjects' ages at the time of the first episode. Female distribution peaked at the age of 15 years, whereas that of the males peaked at the age of 17 years. Table 1 shows the other symptoms of narcolepsy observed among subjects in this study. Cataplexy was found more frequently in the subjects who experienced no *kanashibari* phenomenon [subjects of K(-)] than in the subjects of K(+) ( $\chi^2 = 9.275$ ,  $df = 2$ ,  $p < 0.01$ ).

## DISCUSSION

Almost all subjects were familiar with the term *kanashibari*. The subjects described their experience before being introduced to our definition of a *kanashibari* attack. One description of the condition follows.

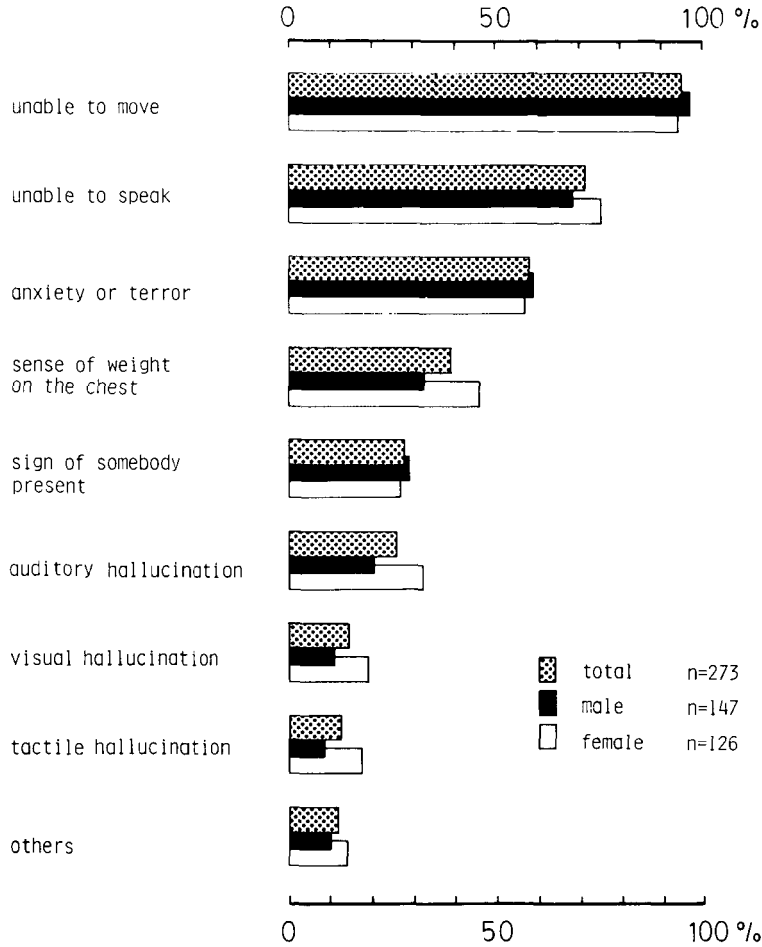


FIG. 2. Details of the symptoms of *kanashibari* attack.

Features of Kanashibari Attack

I suddenly woke up from sleep and found that I couldn't move a bit. I couldn't speak, either. I saw a figure, which resembled a Buddhist image, on my stomach. I was very frightened.

The description of the experience shows how strikingly similar such a description is to reports of sleep paralysis. This striking similarity leaves little room for doubt that *kanashibari* and sleep paralysis are identical, and that some *kanashibari* attacks contain hypnagogic (hypnapompic) hallucinations. These mysterious features of a *kanashibari* attack as described above probably cause some people to believe that evil spirits cause the phenomenon.

There was a similar case in the western world in the last century (12). Sleep paralysis (and hypnagogic hallucination) are well known in folklore and have often been described as part of nightmares. Some people have believed that night-fiends were responsible for the phenomenon (12). Other examples include the "old hag" in Newfoundland and "*kokma*" in the West Indies (13).

Many subjects (43.0%) reported having experienced a *kanashibari* attack. Because

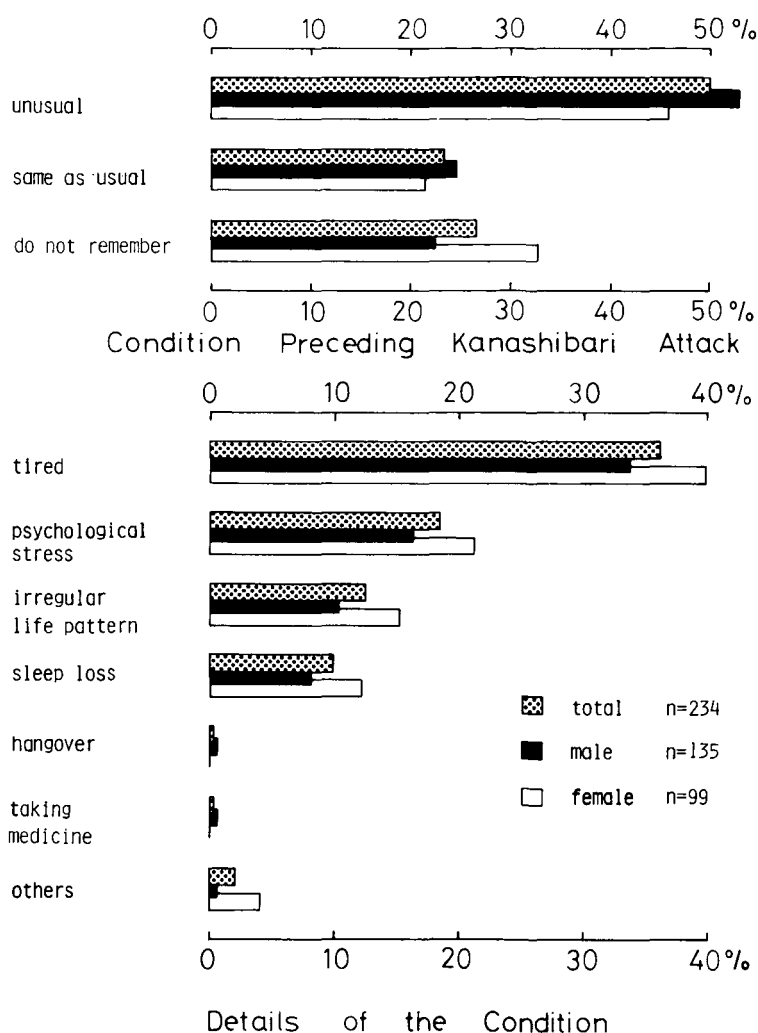


FIG. 3. Physical or psychological condition preceding *kanashibari* attack.

13 subjects of K(+), however, did not report the symptom "unable to move," their experience, which they regarded as *kanashibari*, was probably not identical to sleep paralysis. Moreover, in eight cases reporting *kanashibari* attack, frequent cataplexy or sleep attack was observed. These subjects cannot be considered as having "isolated" sleep paralysis. Even if these 20 subjects (one subject did not report "unable to move" and reported frequent cataplexy as well) are eliminated, 39.8% of all subjects reported a *kanashibari* experience that was probably identical to isolated sleep paralysis. This figure (39.8%) is still extraordinarily high as compared with the percentage of those reporting the phenomenon in the ASDC classification (1) and in other reports (2,10,11). This extraordinarily high figure leads us to believe that some misunderstanding exists among the reported cases in this study.

Recently, Bell et al. (14), however, reported that isolated sleep paralysis occurred in about 40% of black subjects. They concluded that the incidence of isolated sleep paralysis in the black population is higher than that in the white population.

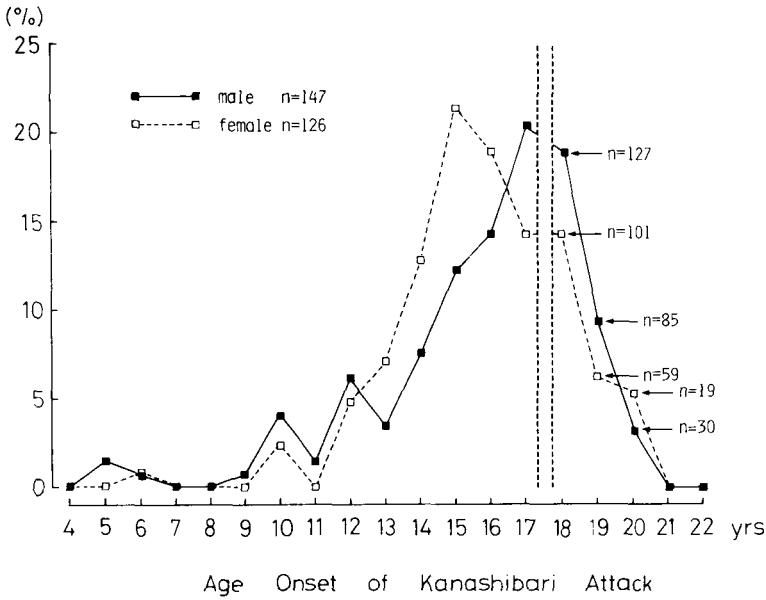


FIG. 4. Distribution of age at onset of *kanashibari* attack. Over 18 years, subjects younger than or equal to each age were eliminated. Number of subjects at each age is shown.

That the difference is racial, however, is doubtful, because Ness (13) reported that about 60% of people living in Newfoundland, who are descendants of European settlers, experienced the old hag phenomenon, which is identical to isolated sleep paralysis. Thus, probably no racial differences exist. Despite being much higher than the figures reported in other studies, the percentage of the incidence of *kanashibari* is probably valid.

Why were the percentages of the incidence so different among the investigations? In the studies with a higher percentage, the phenomena, which were identical to isolated sleep paralysis, had been well known to the subjects through folklore (ref. 13 and this study), or the survey had been made by interviewing the subjects (13,14). On the other hand, in the other studies (2,10,11), subjects were given only a medical description of the phenomenon and were administered a questionnaire. For these reasons, subjects could answer "yes" to the question more easily in the former surveys (refs. 13 and 14 and this study) than in the latter ones (2,10,11). Indeed, one of Everett's (10) subjects at first contemplated answering no, for fear that a yes answer might be thought to carry undesirable psychiatric implications.

About half of the subjects of K(+) reported that they were physically or psychologi-

TABLE 1. Other symptoms of narcolepsy and *kanashibari* experience

Frequency	Cataplexy		Sleep attack	
	K(+)	K(-)	K(+)	K(-)
Often	6 (2.2)	5 (1.4)	2 (0.7)	5 (1.4)
Rare	42 (15.4)	91 (25.1)	36 (13.2)	45 (12.4)
Never	225 (82.4)	266 (73.5)	235 (86.1)	312 (86.2)

K(+), subjects who experienced *kanashibari*; K(-), subjects who experienced no *kanashibari*. Number (percentage) of subjects.

cally not in condition before their *kanashibari* experience. These poor conditions can be summarized in two categories. First, responses "tired" and "psychological stress" can be classified as physical or psychological stress. Second, responses "irregular life pattern" and "sleep loss" can be classified as disturbed sleep and wakefulness cycle. Ness (13) reported that many people in a community in Newfoundland experienced the old hag attack while they were working at lumber camps. During that period, they worked to exhaustion and did not sleep soundly. This also suggests that physical or psychological stress and disturbed sleep and wakefulness cycle are closely connected with the occurrence of the phenomenon.

Nearly all subjects of K(+) had experienced the first episode in adolescence. There was a sex difference in the peak of age of onset, which may explain the higher prevalence in women than in men. These findings suggest that a biological development affects the occurrence of the phenomenon. Moreover, we believe there may be another reason. In Japan, ordinarily at the ages of 15 years and 18 years, young people take entrance examinations, first for high school and later for the university. To pass the examination, they must study hard, usually until midnight or early morning. Thus, they feel stress and live under a disturbed sleep and wakefulness cycle. These two factors (the former is endogenous or biological, and the latter is exogenous or environmental) may affect the occurrence of the phenomenon.

Some subjects in this study had experienced cataplexy or sleep attack. Honda (15) surveyed the sleep habits of 12,469 junior and senior high school students in Japan and reported that 0.41% of all respondents had experienced excessive daytime sleepiness and that 7.56% had had cataplexy. Suspicion of narcolepsy, with obvious cataplexy and marked daytime sleepiness, was found in 0.16% of the students. Therefore, probably there is 1 narcoleptic patient in every 635 college students surveyed in this study. Indeed, one male subject reported frequent cataplexy and frequent sleep attack in the questionnaire; he was, however, among subjects of K(-). Moreover, cataplexy was found more frequently in the subjects of K(-). Hishikawa (16) reported sleep paralysis in 57% of 102 narcoleptic patients. This figure is not very high as compared with that in the normal population. Therefore, sleep paralysis (and hypnagogic hallucinations) may not be specifically related to narcolepsy. We believe that these two symptoms are related only to the disturbed sleep and wakefulness cycle itself.

In two cases, Roth et al. (3) showed familial occurrence of isolated sleep paralysis and hypothesized that isolated sleep paralysis is hereditary and is due to a dominant gene bound to X chromosome. We cannot comment on the possibility that the genetic factor affects the occurrence of the phenomenon because we have no data about the families of the subjects examined in the present study. We suggest, however, from the high prevalence of the phenomenon, that sleep paralysis is a physiological phenomenon rather than a pathological one. Further research is needed to clarify this aspect.

**Acknowledgment:** We wish to thank Dr. Katsuo Yamazaki (Waseda University) for his invaluable assistance in the execution of this research. We also gratefully acknowledge the helpful advice of Dr. Yasuro Takahashi and Dr. Takayuki Tsuboi (Tokyo Metropolitan Institute for Neurosciences) in revising this article.

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