RESEARCH ARTICLE

Predictors of sleep paralysis and relationship of sleep paralysis with sleep quality in university students of Islamabad

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Abstract

Objective: To determine the frequency of sleep paralysis among university students, and to determine the association between sleep paralysis and sleep quality along with different predictive factors leading to sleep paralysis.

Method: The descriptive cross-sectional study was conducted at the National University of Modern Languages, Islamabad, Pakistan, from June to October, 2019, and comprised adult students of either gender who had experienced at least one episode of sleep paralysis in the past. Demographic variables were obtained using Google Form, while experiences of sleep paralysis were assessed using the Waterloo Unusual Sleep Experience Questionnaire, and sleep quality was assessed with the Sleep Condition Indicator. Data was analysed using SPSS 20.

Results: Initially, 440 students were assessed/ Of them, 233(53%) were males, 207(47%) were females, 208(47.3%) were aged 20-23 years, and 129(29.3%) were studying in the third year of their university programme. Of the total, 130(29.5%) subjects had experienced sleep paralysis at least once in their lifetime. The most frequent sensation experienced was feeling of floating 22(16.9%). Mean age at the time of the first experience was 9.7±3.1 years, and 66(50.8%) had experienced the episodes while lying on their back, while 32(24.6%) had positive family history of sleep paralysis. Sleep paralysis had significant relationship with sleep quality (p<0.001).

Conclusion: About one-third of the sample had experienced sleep paralysis once in their lifetime. The relationship between sleep paralysis and insomnia was significant.

Keywords: Insomnia, Sleep paralysis. (JPMA 72: 448; 2022) **DOI: https://doi.org/10.47391/JPMA.1313**

Introduction

Sleep is a naturally recurring state of mind and body characterised by altered consciousness, relatively inhibited sensory activity, reduced muscle activity and inhibition of nearly all voluntary muscles during rapid eye movement (REM) sleep, and reduced interactions with the surroundings.

Sleep paralysis (SP) is a parasomnia and it involves a time period during which all voluntary muscular movements of the body are suppressed. Respiratory and eye movements are not affected and one can easily perceive his/her immediate environment.[1] SP occurs more in REM sleep than in non-REM sleep. Vivid and lucid dreaming occurs more during REM sleep. A person is severely debilitated throughout the REM sleep phase and there is total atony of all the muscles of body except the respiratory and ocular muscles.[2] The skeletal system is totally paralysed, but the central nervous system (CNS) activity is markedly increased in REM sleep. It is concluded through different researches that this can be due to powerful inhibition by the glycine and γ-aminobutyric acid (GABA) and glycine in the motor nervous system (MNS).[3] The person, during the SP period and even after the episode ends, experiences more likely panic-like symptoms, such as shortness of breath, increased heartbeat and anxiety. The episode usually takes a few seconds to several minutes.[4]

SP episodes occur in association with strange and often-frightening hallucinations.[5] They can be divided into three categories; intruder hallucinations, incubus hallucinations and vestibular-motor hallucinations. Intruder hallucination is the presence of something evil in the room, while incubus hallucination is the feeling of pressure over chest and other parts of body. These two can co-occur.[6,7]

The vestibular-motor hallucination consists of illusory movement experiences, such as floating above the bed SP is usually found in individuals who have other different sleep disorders as well, such as narcolepsy.[8] When these different sleep disorders are absent, then it is called isolated sleep paralysis (ISP).[9] Very rarely, ISP can occur repeatedly and is termed recurrent isolated sleep paralysis (RISP), and studies have shown that it usually runs in families.[10] Studies on various ethnic populations have shown that SP occurs more in Japanese population 84% compared to Canadian 58%.[11]

The projected prevalence rate of SP in the whole

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population is approximately 8% whereas individual studies estimate it to be from 2% to 60%. Besides, 7.6% of the general population experiences at least one SP episode over the course of their lives. It is generally more common in psychological patients and students.[12] Research done on normal healthy participants found that there is marked relationship between occurrence of SP and the subjectively rated sleep quality. One study conducted in China with a very large sample of 11,754 subjects reported that there was more incidence of SP in individuals who marked their sleep poor or very poor, and less incidence in those who marked their sleep good.[13] Similar results were also reported by a Japanese study that evaluated SP in more 90,000 participants.[14] A research in Lahore showed that 35.6% subjects experienced at least one SP episode with mean onset age of 16 years.[15]

Due to the lack of systematic testing, there is no advantage with behavioural interventions, like cognitive behavioural therapy (CBT) and sleep hygiene education (SHE), that are proposed for SP12. By and large, a good sleep can prevent from SP occurrence.[12]

Very little research work has been done on this topic in Pakistan and data is significantly lacking. The current study was planned to determine SP frequency among university students, and to determine the association between SP and sleep quality along with different predictive factors leading to SP.

Subjects and Methods

The descriptive cross-sectional study was conducted at the National University of Modern Languages (NUML), Islamabad, Pakistan, from June to October, 2019. After approval from the ethics review committee of the Foundation University Medical College, Rawalpindi, the sample size of 350 was calculated by using the Open Epi calculator[15] with 95 confidence interval (CI), 5% absolute precision and SP prevalence of 35%.[16] After permission from the NUML administration, the sample was raised using non-random convenience sampling technique in view of the expected low response rate. The sample comprised adult students of either gender regardless of the year of studies. After data collection, the final sample included students who had experienced at least one SP episode in the past. Those who were suffering from any other sleep disorder were excluded and so were all the incomplete forms.

Data was collected using Google Forms along with the modified version of the Unusual Sleep Experiences Questionnaire (USEQ)[17] and the Sleep Condition Indicator (SCI)[17] scales. The USEQ was modified after taking permission from the authors. The USEQ comprises questions regarding age at first SP episode and details regarding frequency of experiences and perception about the cause[17] The SCI is a reliable and valid tool used as a means to screen and assess insomnia in a clinical setting. It has 8 items that are scored 0-4, with a total possible score range of 0-32. A lower score represents poor sleep, and ≤16 is the cut-off value used to screen people who possibly suffer from insomnia.[18]

Data was analysed using SPSS 20. Mean and standard deviations were calculated for numerical variables, like age. For categorical variables, frequencies and percentages were calculated. Chi-square test was applied to determine the association between insomnia and SP occurrence. P<0.05 was considered statistically significant.

Results

Initially, 440 students were assessed/ Of them, 233(53%) were males, 207(47%) were females, 208(47.3%) were aged 20-23 years, and 129(29.3%) were studying in the third year of their university programme (Table-1).

Table-1: Demographic characteristics of respondents (n=440).

Demographics	n (%)
Age	
20-23yrs	208(47.3)
24-26yrs	192(43.6)
27-30yrs	40(9.1)
Gender	
Male	233(52.9)
Female	207(47.1)
Semester	
1st/2nd	88(20)
3rd/4th	118(26.8)
5th/6th	129(29.3)
7th/8th	105(23.9)
Residence	
Day-scholars	285(64.7)
Boarders	155(35.3)

Of the total, 130(29.5%) subjects had experienced at least one SP episode in their lifetime. Overall, 56(43%) students experienced SP episodes less than once a month or occurrence of the last episode had been more than one year earlier, 54(41.5%) experienced episodes at least once in a month but less than once a week, and 20(15.4%) reported at least once per week.

The most frequent sensation experienced was feeling of floating 22(16.9%), while the least common was auditory hallucination or hearing unusual sounds 8(6.2%) (Table-2).

Mean age at the time of the first experience was 9.7±3.1 years, with 53(40.7%) having experienced their first episode aged <10 years, followed by 40(30.1%) aged 11-20

Table-2: Frequency of experiences during sleep paralysis. (n=130).

Experiences	Never n (%)	Occasionally n (%)	Frequently n (%)	Always n (%)
Felt someone presence in room	33(25.4)	46(35.4)	41(31.5)	10(7.7)
Felt pressure on body	12(9.2)	48(36.9)	57(43.8)	13(10)
Heard unusual sound	25(19.2)	42(32.3)	55(42.3)	8(6.2)
Felt numbness/tingling/vibration	13(10)	41(31.5)	65(50)	11(8.5)
Felt suffocated/smothered/strangulated	43(33.1)	40(30.8)	37(28.5)	10(7.7)
Felt sensation of floating/falling	33(25.4)	38(29.2)	37(28.5)	22(16.9)
Felt unusual odours	39(30)	30(23.1)	46(35.4)	15(11.5)

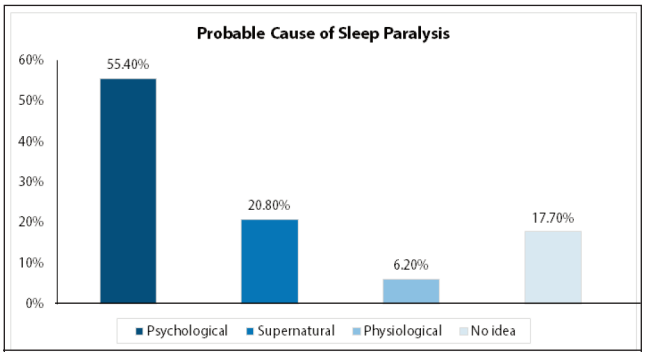

Figure: Probable cause of sleep paralysis according to the respondents.

years. More than one-third 48(36.9%) reported that they had been emotionally disturbed/had sleep disturbances/under stress etc. before the occurrence of SP. During an SP episode, 66(50.8%) were lying on their back, followed by sleeping on left / right side 28(21.5%), on their stomach 17(13.1%), and 19(14.6%) reported that sleep position made no difference.

Probable cause of SP, according to majority of respondents, was psychological (Figure).

During an SP episode, respondents reported being unable to move for <1 minute 40(30.7%), 1-5 min 33(25.4%), and >5 min 16(12.2%). Further, 80(61.5%) students experienced SP episodes while asleep, while 50(38.5%) had this experience upon awakening. Also, 32(24.6%) subjects had positive family history of SP.

Among those who had experienced SP, 58(44.6%) had SCI score ≤16 suggestive of insomnia. Among the 310(70.5%) respondents who did not experience SP, 69(22.25%) had SCI score ≤16, indicating a significant relationship between SP and quality of sleep (p<0.001).

Discussion

Sleep quality affects everyday life experiences to the core. Inadequate sleep or disorders will result in adverse social behaviours leading to chaos. The current study focussed on highlighting one of the sleep disorders and its effects. SP was experienced by130(29.5%) participants at least once during their lifetime. An earlier study on Pakistani medical students reported 35.6% SP prevalence.[13] This might be due to the fact that medical students have better understanding of terminologies used in SP compared to the non-medical students in the current study. Those who suffered from SP of one episode in a year or less were 43.1% which was significantly higher than the earlier study on medical students[13] and was more in line with a study reporting 33%.[19] The reason for the increase could be that in the questionnaire used in the current study, the differentiation was not made on the basis of total number of episodes, but on the basis of frequency of episodes. Another research at the University of Sheffield showed 64% participants experienced SP in their lifetime once at least which is higher than the current study.[20] This might be due to the fact that both genetic and environmental factors influence SP occurrence. The current study's mean age of 9.7±3.1 years was found to be less than the normally reported 11-20 age group.[13,21,22] Decreased attention of parents, poverty and child abuse could be the reason for this decrease. It was found that SP was slightly more prevalent in males (52.3%) compared to females (47.7%) which is in contrast to a study.[22] This may be due to psychosocial problems and peer pressure faced by males in the community.

The most common experience during sleep was feeling of numbness, followed by auditory, vestibular and olfactory hallucinations, while the least common was the feeling of suffocation. This is not in accordance with other researches in which auditory hallucinations were the least common experience. A study documented a higher frequency of incubus hallucination during SP.[23]

A study[24] showed that supine position was the most common position in which the participants experienced SP an episode, which is similar to the finding of the current study.

Sleep quality has a major role in the maintenance of normal life, and it has been observed that SP is related to sleep quality.[25] According to the current study, 44% patients with SP had a score of equal to or less than 16, indicating that they had insomnia, which was found to be statistically significant with SP, affirming the hypothesis of a connection between subjective quality of sleep and SP. A similar study done on Chinese adolescents by S Ma et al has also showed that participants with poor sleep quality had more chance of suffering from SP (in 12.7% of participants with <5 hour sleep) compared to those with normal sleep quality (in 4.5% participants with 7-8 hour sleep).[14]

A study among Nigerians[9] showed that most SP subjects thought that cause was supernatural (39.1%). In the current study, majority of participants (55.4%) believed that it was

due to psychological factors, while one study reported that majority of participants had no idea what might be the cause of SP.[13] Another study conducted on African-American subjects indicated that 69.6% subjects believed the cause to be psychosocial.[26] This may be due to diverse cultural and medical interpretations of this phenomenon.

The most common time of SP occurrence was on awakening in two studies.[9,26] In the current study, 61.5% participants experienced SP during sleep.

Conclusion

Approximately 30% of the study population had experienced SP in their life. There was a significant relationship between SP and insomnia.

Disclaimer: None.

Conflict of interest: None.

Source of Funding: None.

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