Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 5s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Correlation Between Quality of Sleep and Perception of Pain

Dr. Maitreyi Kamble[1], Dr. Smita Patil[2]

[1]MPT Cardiopulmonary Physiotherapy, Krishna College Of Physiotherapy, KVV, Karad, Maharashtra.

Orcid Id- https://orcid.org/0009-0000-0985-385X

Email ID - drmaitreyikamble01@gmail.com

[2]HOD Of, Dept Of Sports Physiotherapy, Krishna College Of Physiotherapy, KVV, Karad, Maharashtra.

Email ID - smitakansee@gmail.com

Cite this paper as: Dr. Maitreyi Kamble, Dr. Smita Patil, (2025) Correlation Between Quality of Sleep and Perception of Pain.. *Journal of Neonatal Surgery*, 14 (5s), 238-242.

ABSTRACT

Introduction: A cross-sectional study was carried out including 93 people between the age group of 30 to 40 years, who had sleep disturbances to a chronic level, to evaluate whether the lack of sleep really affects the body, and if yes, then to what extent does it affect. This study was conducted in Maharashtra.

Method: The study was conducted among 93 participants who were within the age group of 30 to 40 years. Samples were collected according to the patient's consent by sending them Google forms. Google forms included a questionnaire on the same.

Results: Based on the statistical analysis obtained from the study, the prevalence of correlation between quality of sleep and perception of pain among the participants under the age group of 30 to 40 years was considered extremely significant (p 0.0001). And 46.75 % of prevalence was seen among the participants experiencing increased perception of pain due to poor quality of sleep.

Conclusion: Thus, the article guides us to the conclusion that disturbed or incomplete sleep can lead to increased perception of pain, and can give rise to a pain of unknown origin.

Keywords: *RBPT- Rose Bengal Plate test, SAT-Serum Agglutination Test, ELISA IgM- Enzyme linked immunosorbent assay Immunoglobulin M, ELISA IgG- Enzyme linked immunosorbent assay Immunoglobulin G, PUO- Pyrexia of unknown origin.*

1. INTRODUCTION

The recent lifestyle causes the major role in sleep disturbance of an individual. The disturbed sleep in a chronic level is a catabolic stressor and also increases the risk of metabolic dysfunction with loss of muscle mass and function[5]. The importance of sleep for cognitive function is widely recognised[1]. Sleep deprivation and the ensuing exhaustion have a detrimental effect on physical welfare, and behavioral health, it can significantly affect the performance of an individual. Deterioration in fundamental skills such as target acquisition, marksmanship, response time, and key decision making has been associated with sleep deprivation[1]. Decreased sleep is known to be associated with a wide range of physical, mental, and emotional illnesses, however, much is still unknown about how sleep impacts the body and mind and vice versa [2]. Human health depends on sleep, which is essential for survival[3]. Sleep disturbances have been identified as useful indicators of the onset of new episodes and exacerbation of symptoms associated with chronic pain disorders such as fibromyalgia [4]. Sleep disturbance on the chronic stage causes various metabolic dysfunction and includes changes in body composition as well [5]. As sleep boosts the physical performance and cognitive processing, it can also cause physical, mental, and emotional disturbance[6]. Diminished sleep increases the risk of musculoskeletal injury. Studies show that the disordered sleep causes greater pain intensity. Disturbed sleep causes a maladaptive response towards the neural regulation of pain, thus causing the impairment in the body's ability to modulate pain[6]. Also, studies show that diminished sleep increases fatigue levels of individuals. There is difficulty of concentration which causes poor performance and thus results in poor quality of the task [3]. The circadian rhythm regulates the sleep wake cycle of the body.

The circadian rhythm is regulated by two parts:-

1. The master clock of suprachiasmatic nucleus (SCN) of hypothalamus.
2. The peripheral part of clock exists in peripheral tissues. For example, skeletal muscles.

The master clock is a time keeper of the whole body. It also influences the peripheral circadian clock by the regulation of neural and endocrine pathways. The peripheral part of the clock also has an independent muscle clock which is not only under the influence of SCN but also under the influence of feeding and exercise cycles. The clock genes in the skeletal muscles, which are operated in the SCN and also on its own rhythm based on the feeding and exercise timings, regulates the muscular or osseous specific biological functions. As skeletal muscles play an important role of the control of nutritional homeostasis and maintaining glucose and calcium levels, therefore, indirectly or directly, the body's mechanism of metabolism is based on the circadian rhythm of the body[7].

Also, the metabolic regulation within the skeletal muscle is dependent on the intrinsic skeletal muscle molecular clock. Hence, according to these studies, the body, the skeletal muscles, and the organs dependent on glucose and protein and such elements follow their metabolism work according to the circadian rhythm. Disturbance in such rhythms can cause various metabolic changes throughout the body, including all the systems of the body and their metabolism and functions[7].

Also, it leads to the inhibition of bone formation and activation of bone resorption. Thus, it comes to the focus that the disturbed circadian rhythms due to lack of sleep can deregulate the whole-body mechanism causing various problems, especially the musculoskeletal problems [7]. Here, the study is to be made to take the prevalence of the body pain, fatigue, decreased endurance, and increased sensitivity towards pain as the resultant factors of the same.

It is proved that the tasks that require additional energy expenditure can also be impaired due to sleep deprivation. The reduction in performance is also associated with muscle glycogen reduction and perceptual stress as a result of sleep deprivation. There can also be negative mood disturbances and impairment in the reaction time to a greater extent. Thus, it contributes to the deterioration of muscle function. The oxidative stress observed in the previous studies was a consequence of exposure to physical and physiological stressors, which are ultimately due to sleep deprivation. [8]

There is a common neurobiological system that the modulation of pain and sleep-wake regulation share, therefore, it promotes the suggestion that poor sleep can alter pain processing. As there are various studies that show the neurochemical changes during and after sleep deprivation, which hold the potential to get involved in the modulation of pain. Moldofsky et al was among the very first to research the relationship between sleep disturbance and pain threshold [9].

The theory was proposed that non-rapid eye movement sleep deprivation involved the pathogenesis of fibromyalgia and caused myalgia pain. This is because of the increased pressure pain sensitivity as well as muscular pain due to sleep disturbance. It can furthermore add up to the resultant effects such as an increase in fatigue levels, negative impact on mood, and also cognitive dysfunctions. But according to the article, the effect observed is still questionable about whether it is due to alteration of pain processing caused by sleep deprivation or not. The findings of the articles on the effects of sleep deprivation permit only a limited generalization to chronic pain conditions arising due to weeks, months, or years of sleep deprivation [9]

As there is a report observing the increased pain sensitivity following the experimentally induced sleep deprivation [9]. It is necessary to study to what extent sleep deprivation can cause an increase in pain sensitivity among humans. Therefore, here the targeted population, which comes under the age group of 30 to 40 years with the problems such as lack of sleep or sleep deprivation due to any environmental or physical reasons are chosen to extract the findings about the relationship between sleep deprivation and increased pain sensitivity, fatigue levels, and decreased endurance.

2. METHODOLOGY

A survey type study was carried out on 93 people from Maharashtra who experienced a disturbed sleeping pattern and a lack of sleep. The study was carried out by sending Google form from different social media. We questioned the patients and checked the lifestyle factors of the patients. A case sheet was made which asked the name, age, gender, and email address. A special questionnaire was formulated to check the sleeping patterns of the people, and thus, according to the same, they were asked about the various effects they would face due to lack of sleep.

Sampling method- Random sampling method was used, and forms were sent to those who had a lack of sleep.

Inclusion criteria- Male and female between the age group of 30 to 40 years who lacked in their sleep.

Exclusion criteria- People with good sleep, people above 30 years of age and people below 40 years of age.

Sample size:

It was calculated using formula $4pq/L^2$. The sample size calculated was 93.

Research tool and data collection:

Data was collected by circulating questionnaire among people between the age group of 30 to 40 years of age. The questionnaire was in English as it was collected in urban area, there was not any issue for communication between researcher and respondents.

Ethical Committee approval:

The study was approved by Institutional Ethics Committee of Krishna Institute of Medical Sciences, "Deemed to be University," Karad. An explanation about the study and questionnaire was given to respondents and informed consent was obtained from them. They also had authority not to participate in the questionnaire. All the respondents participated voluntarily and their confidentiality was maintained throughout the study.

Questionnaire:

A questionnaire was formulated and validated by the experts. The questionnaire was prepared in English for data collection. It was divided into demographic data, lifestyle of people, their sleeping patterns, and the effects they felt on their body due to lack of sleep. Initially, demographic information of the respondents was obtained, which included name, age, gender, and e-mail address. This information was obtained to analyze the percentage of people who lacked sleep, and who felt its effects on their body.

3. RESULTS

The questionnaire for assessment was used to determine whether the lack of sleep affects their body or not. The study was conducted in 93 people who were within the age group of 30 to 40 years of age. Samples were collected according to the patient's convenience and consent by sending them Google forms. Google forms included a questionnaire on people's sleeping habits, their actual and required sleeping periods, the effects of lack of sleep they personally observed on their body. There were total 18 questions out of which 7 questions were on their sleeping habits, 2 questions were asking whether their lack of sleep affects their body, 3 questions were asking whether their lack of sleep affected their energy levels, 3 questions were about the changes in their pain threshold caused due to lack of sleep and 3 questions were about their decreased performance due to sleep deprivation.

The responses for the questionnaire were given by 93 respondents, in which the respondents had a disturbed sleeping pattern, and most of them faced lack of sleep due to many reasons.

Table: 1

Do you think your incomplete sleep affects your body?	Total response	Yes	No	Percentage	
				Yes	No
Age - 30 to 40	93	91	2	97.8%	2.2%

Total 97.8% people experienced that their incomplete sleep affected their body (refer table 1).

Table: 2

Do you feel fatigue while working when you had an incomplete sleep?	Total response	Yes	No	Percentage	
				Yes	No
30 to 40	93	88	5	94%	6%

Total 94.6% experienced fatigue while working when they did not sleep well at night (refer table 2).

Table: 3

Do you feel to do any work which requires energy when you had an incomplete sleep?	Total response	Yes	No	Percentage	
				Yes	No
30 to 40	93	15	85	87.1%	12.9%

While 87.1% people agreed that they do not feel to do any work which requires energy when they had an incomplete sleep (refer table 3).

Table: 4

Do you feel muscle weakness while performing your daily work when you had an incomplete sleep?	Total response	Yes	No	Percentage	
				Yes	No
30 to 40	93	83	10	88.2%	11.8%

88.2% people felt weakness while performing their daily work when they had an incomplete sleep (refer table 4).

Table: 5

Do you feel any muscle pain of unknown origin during performing your daily work when you had an incomplete sleep?	Total response	Yes	No	Percentage	
				Yes	No
30 to 40	93	86	7	92.5%	7.5%

Total 92.5% people felt muscular pain of unknown origin when they had an incomplete sleep (refer table 5).

Table: 6

Do you find an already existing muscle pain to be increased in intensity when you had an incomplete sleep?	Total response	Yes	No	Percentage	
				Yes	No
30 to 40	93	81	12	87.1%	12.9%

87.1% people felt that their already existing pain sensations increased in intensity when they had an incomplete sleep (refer table 6).

4. DISCUSSION

The study was conducted among people in the age group between 30 and 40 years. The participants were enrolled in various types of jobs, such as businessmen, doctors, engineers, etc.

86% of them didn't experience a sound sleep. 92.5% of people complained of decreased sleeping period, which can be due to various reasons such as job consequences, household work, or various functions, etc. 91.4% of the people had enough sleeping period but had a disturbed sleep. Around 92.5% of people agreed that they should have more than 7 hours of sleep as it affects their entire next day of working.

Among them, 97.8% of people agreed about the fact that their incomplete sleep affects their body in various ways, which can be increased fatigue levels, decreased pain threshold, and increased pain sensitivity (refer to table no. 1). 94.6% of people complained of fatigue while working when they did not sleep well at night (refer table no. 2), while 88.2% of people complained of generalized weakness due to incomplete sleep (refer table no. 4). This makes it clear that the metabolic

mechanism is disturbed when one has an insufficient and incomplete or disturbed sleep. As the concept introduced in the previous research article stated that chronic sleep loss is a potent catabolic stressor, increasing the risk of metabolic dysfunction of muscle. Thus, an increase in fatigue level and experiencing weakness are symptoms of the same, which were experienced by the people participating in the study. Hence, it concludes that sleep disturbance or incomplete sleep can alter the metabolic function of muscle as well.

There were about 92.5% of people experiencing muscle pain of unknown origin when they had an incomplete sleep (refer to table no. 5). Also, as mentioned in the article, sleep deprivation appears to enhance pressure pain sensitivity[5]. Hence, it concludes that pain sensitivity is increased due to lack of sleep.

Also, there were findings about the increasing intensity already existing of pain due to lack of sleep. There were 87.1% of people experiencing increased intensity of an already existing muscular pain when they had an incomplete sleep (refer to table no. 6).

5. CONCLUSION

The following readings give the findings that prove the relationship between the quality of sleep and an increase in the perception of pain. Thus, the article leads us to the conclusion that disturbed or incomplete sleep can cause fatigue as well as generalized weakness. Lack of sleep can also lead to muscle weakness. It can give rise to a pain of unknown origin and can also increase the intensity of an already existing muscle pain. It also lowers the threshold of pain, which contributes to increasing the pain intensity.

6. RECOMMENDATIONS

The above study is recommended to be used to understand the actual relationship of sleep with pain threshold and perseverance of pain.

7. LIMITATIONS

The article does not provide the information about the pathomechanism taking place related to sleep and sleep disturbance other than those mentioned above.

REFERENCES

[1] Teyhen DS, Capaldi VF, Drummond SPA, et al. How sleep can help maximize human potential: The role of leaders. Journal of Science and Medicine in Sport. 2021;24(10):988-994. doi:10.1016/j.jsams.2021.08.012

[2] Gao B, Dwivedi S, Milewski MD. CHRONIC LACK OF SLEEP IS ASSOCIATED WITH INCREASED SPORTS INJURY IN ADOLESCENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS. th Annual Meeting.

[3] Consensus Conference Panel:, Watson NF, Badr MS, et al. Joint Consensus Statement of the American Academy of Sleep Medicine and Sleep Research Society on the Recommended Amount of Sleep for a Healthy Adult: Methodology and Discussion. Journal of Clinical Sleep Medicine. 2015;11(08):931-952. doi:10.5664/jcsm.4950

[4] Staffe AT, Bech MW, Clemmensen SLK, Nielsen HT, Larsen DB, Petersen KK. Total sleep deprivation increases pain sensitivity, impairs conditioned pain modulation and facilitates temporal summation of pain in healthy participants. Biagini G, ed. PLoS ONE. 2019;14(12):e0225849. doi:10.1371/journal.pone.0225849

[5] The effect of acute sleep deprivation on skeletal muscle protein synthesis and the hormonal environment. (2021) Severine Lamon, Aimee Morabito, Emily Arentson – Lantz

[6] How sleep can help maximize human potential: The role of leaders. Journal of science and medicine in sport Deydre S. Teyhen, Vincent F. Capaldil, Sean P. A. Drummond:- 24 (2021) 988-994.

[7] Effects of one night sleep deprivation on hormone profiles and performance efficiency. (2001) Victor Hng-hang Goh, PhD FR CPath. Effects of a 36 hours survival training with sleep deprivation on oxidative stress and muscle damage biomarkers in young healthy men. (2018) Ewa Jowko, Pawel Rozanski and Andrzej Tomczale

[8] The effect of sleep deprivation on pain. (2004)Bernd Kundermann Dipl-Psych, Jurgen-Christian Krieg MD, Wolfgabg Scheiber MD, Stefan Lautenbacher Phd[2].

[9] Total sleep deprivation increase pain sensitivity, impairs conditioned pain modulation and facilitates temporal summation of pain in healthy participants. (2019) Alexander Torp Saffe, Mathias Bech, Sara Lauise Kjaer Celmmensen, Henriette Tranberg Nielsen, Dannis Boye Larsen, Kristian Petersen:-