



Research article

Association of poor sleep with low back pain among symptomatic and asymptomatic population**Sneha Nemade, Pratik Phansopkar*, Sakshi P. Arora**

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ABSTRACT

Although Low back pain puts an immense economic strain on healthcare services, this disease is responsible for impacting people's daily lives. Sleep quality has gained interest for people with musculoskeletal pain conditions as a contributing factor to the outcome. Sleep consistency has created consideration as a risk factor to the outcomes for people with MSK pain disorders. According to several studies, there is a bidirectional relationship between pain severity and sleep quality. The recent focus on the interaction of inflammatory processes in pain and sleep, on the one hand, leads to neuro-immunological pathways that may contribute to the close relationship between pain and sleep, on the other. To study association of poor sleep with low back pain among symptomatic and asymptomatic population. All asymptomatic and symptomatic individuals with low back pain in the group between 35-50 years of age filled the survey using Visual Analogue Scale (VAS) and Insomnia Severity Index Questionnaire, and the data was analyzed. There's a link between low back pain and a lack of sleep. When compared to asymptomatic individuals, the visual analogue score for pain and the insomnia severity index score were higher in the symptomatic low back pain population, implying a bidirectional relationship between low back pain and poor sleep. In this study, we discovered a link between poor sleep and low back discomfort. This research found that there is a bidirectional relationship between low back discomfort and poor sleep, with one affecting the other and vice versa.

Keywords: Low back pain, sleep, poor sleep Visual Analogue Scale, Insomnia Severity Index.

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INTRODUCTION

The major contributor towards the ages of disability is lower back pain [1][2]. Non-specific low back pain is characterized by the LBP not induced by any familiar cause [3] which accounts for 90–95 percent of LBP cases [1][4]. Non-specific LBP is reported to have an 18 percent incidence point [1]. Although low back pain puts an immense economic strain on healthcare's service, this disease has been responsible for impacting people lives. Widely common illness impacting persons of every age is low back pain. Back-related impairment and population burden have increased despite the plethora of low back pain therapies and health-care services [5].

According to Global Burden of Disease 2015 report, wherein illnesses were evaluated by how much hindrance they cause in ages lost with inability, Low back pain was positioned as world's biggest supporter of disability [6][7]. Several reports have stated that low back pain is amongst the much frequent reason of admissions in the hospital and in many areas of the world it is prime cause of movement disabilities and absenteeism at work. LBP possess a major economic trouble not only to individual but the family, employer plus society.

Studies have now reported a growing prevalence in emerging countries, originally thought to be a concern limited to developed countries. While low back pain could be manifested any time in life, it's more prevalent during third decade. Presence of low back pain at an early age may induce development of disease, resulting in chronic kind of LBP which carries high potential in reducing the quality of life of a person [8][9].

Sleep is an intricate and fundamental organic element with the social objective of keeping up homeostasis by methods for various physiological frameworks: recuperation of physical and mental health, learning, physical wellness, cognition, passionate control, memory, and brain plasticity consolidation, just as mammalian in general health. Various studies have demonstrated that brief rest in all population, is major cause for fatigue, high blood pressure, insulin resistance, cardio and vascular disease [10]. Poor sleep additionally gives a significant and complex threat factor for a wide number of physiological issues and physical disorders, dementia, chronic pain, DM and all-cause mortality [10][11][12].

Sleep consistency has created consideration as a risk factor to the outcomes for people with MSK pain disorders. Some studies show two way connection between pain and quality of sleep^{[2][3]}. Poor quality of sleep in individuals having chronic back pain seems linked with worsening of pain, effects physical activity along with catastrophic pain^[13]. It is unclear if pain is more associated with a specific form of sleep problem or with more composite measures of sleep disruption. Consistent efforts have been done to gradually shed a light over a relationship existing midst sleep and pain in mechanical, interventional and epidemiological research^[14]. A new meta-analysis of combined estimations from thirty seven studies with the help of polysomnography of chronic pain population, for instance, had reported a presence of about 78% insomnia^[15].

In recent reviews, this association between sleep and pain is reiterated^{[14][16]}, which highlighted a maximum robust unidirectional impact of inadequate sleep towards pain exacerbation together with insecurity, as opposed to prior studies exploring (bi)directionality^[17]. Epidemiological trials have found that inadequate quality of sleep and short length of sleep are risk factors landing up into chronic type pain^[18]. In addition, there are good evidences that shortened or interrupted sleep could result in hyperalgesia (heightened exposure to painful stimuli) and spontaneous pain effects to grow or intensify (like headache, muscle ache). This correlation had been seen in a variety of laboratory sleep deprivation subjects where sleep was reduced or disturbed from one or many days and results were measured using reports of subjective pain and/or objective measures for sensation. In chronic pain populations, such bidirectional association between sleep deprivation and the pain helps to reinforce, amplify deficiency of sleep and pain through an atrocious loop; for say, the sleep after a poor night raises pain that disturbs sleep, then the cycle gets perpetuated and amplified with time^[16].

However, casual direction joining deficient sleep and pain had remained an open mystery, whether the quality of sleep puts various effects over low back pain all throughout day^[19]. Recent attention on association between inflammatory process of pain, on one side while sleep other one leads to the neuro-immunological mechanisms which may lead to the close correlation between pain, sleep. The objectives were to evaluate effect of poor sleep on low back pain and to evaluate poor sleep association with low back pain in asymptomatic population

METHODOLOGY

The participants in this study were from Datta Meghe Institute of Medical Sciences, Deemed to be University's Musculoskeletal OPD Sawangi (Meghe), Wardha, Maharashtra, India, and the study was conducted with Institutional Ethics Committee permission. The study lasted six months and was an observational cross-sectional study. With a sample size of 200, the sampling design

was simple random sampling.

In the year 2021, Nemade et al. released a research protocol that found a bidirectional association between pain intensity and sleep quality. Recent research into the connection of inflammatory processes in pain and sleep has led to neuro-immunological pathways that could explain the strong association between pain and sleep^[20]. The inclusion criteria was both male and females with age group of 35-50 years. Low back pain population individuals with low back pain at baselines and asymptomatic individuals. The exclusion criteria was low back pain with radiculopathy, chronic low back pain patients and Patient on sedatives. Outcome measures was Insomnia Severity Index and Visual Analogue Scale

Procedure

The institutional ethical committee clearance was obtained (IEC) DMIMS. The principal of Ravi Nair Physiotherapy College granted approval for the study, after which the work began. The targeted population was selected from Musculoskeletal OPD, Wardha. The participants were selected as per the inclusion and exclusion criteria. The target population were explained procedure of the study.

Figure 1: Study Flow-chart



Evaluation of low back pain

Pain assessment – The individuals were asked to mark their pain intensity on a 10-point visual analog scale. Palpation and percussion of the spine- Using palpation and percussion the point tenderness over the spine was checked. Palpation of paraspinal muscles was done to check the muscle spasm. Range of motion- Patients with low back discomfort had their forward flexion, extension, lateral flexion, and lateral rotation all measured. Gait and posture – All patients with low back discomfort had their walking and general posture observed. After that the patients were provided with insomnia severity index questionnaire and scoring

was done.

Evaluation of insomnia severity index

The insomnia severity index consists of seven questions, with each answer adding up to a total score. Guidelines for scoring or interpretation for insomnia severity index is that to get your total score, sum the scores from all seven questions (question 1+2+3+4+5+6+7).

Total score categories:

- 0-7 - No clinically significant insomnia
- 8-14 - Subthreshold insomnia
- 15-21- Clinical insomnia (moderate severity)
- 22-28- Clinical insomnia (severe)

In the present study, a total of 200 people were selected 100 with low back pain and 100 asymptomatic population their age ranged between 35 and 50 years. Their visual analog scale was taken and Insomnia severity Index questionnaire was provided. They were then asked to fill the questionnaire with the answers best suited to them.

RESULT

The statistical analysis was carried out using descriptive and inferential statistics, as well as the z-test for difference between two means. The software used in the study was SPSS 27.0, and the threshold of significance was set at $p < 0.05$.

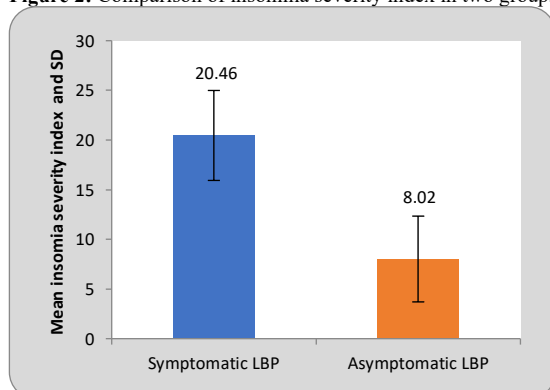
There's a link between low back pain and a lack of sleep. In symptomatic low back pain population, the visual analog score for pain and insomnia severity index score was more which suggests a bidirectional relationship between both low back pain and poor sleep as compared to asymptomatic individuals.

It was revealed that the severity of pain had an effect on sleep disruption. Sleep disruption is prevalent in people with LBP, according to our findings. Furthermore, we discovered that the severity of back pain was only marginally connected to sleep disturbance, indicating that other factors play a role in LBP patients' sleep issues.

Table 1: Comparison of insomnia severity index in two groups z-test for difference between two means

Group	N	Mean	Std. Deviation	Std. Error Mean	z-value
Symptomatic LBP	100	20.46	4.53	0.45	19.85
Asymptomatic LBP	100	8.02	4.32	.043	p=0.0001,S

Figure 2: Comparison of insomnia severity index in two groups



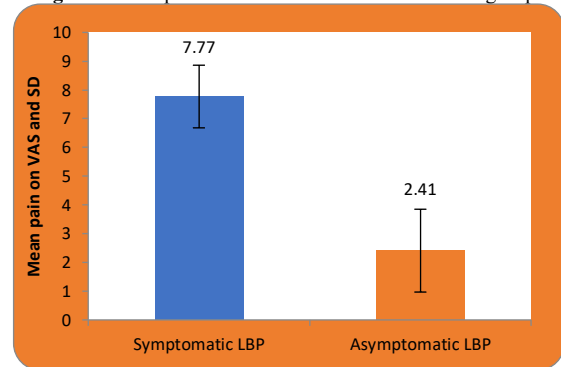
The insomnia severity index score was more in symptomatic low back pain individuals as compared to asymptomatic individuals

which shows that symptomatic low back pain individuals have poor sleep quality. As shown on the above table and chart the Insomnia Severity index mean score for symptomatic low back pain individuals was 20.46 out of 28 scoring which suggests of clinical insomnia (moderate severity).

Table 2: Comparison of Pain on VAS Score in two groups z-test for difference between two means

Group	N	Mean	Std. Deviation	Std. Error Mean	z-value
Symptomatic LBP	100	7.77	1.09	0.10	29.54
Asymptomatic LBP	100	2.41	1.44	0.14	p=0.0001,S

Figure 3: Comparison of Pain on VAS Score in two groups



The pain level on Visual Analog Scale was more in symptomatic low back pain patients with affected sleep quality as compared to that of asymptomatic low back pain individuals. As shown in this graph that mean score for symptomatic individuals was 7.77 on a 10-point scale and 2.41 for that of asymptomatic individuals.

DISCUSSION

Sleep deprivation has been linked to low back discomfort. The visual analogue score for pain and the insomnia severity index score were both greater in the symptomatic low back pain population as compared to asymptomatic people, proving a two-way link between low back pain and lack of sleep. Poor sleep and low back pain were found to have a favorable relationship in this study. This research found that there is a bidirectional relationship between low back discomfort and poor sleep, with one affecting the other and vice versa.

In symptomatic low back pain patients, the insomnia severity index score was greater than in asymptomatic patients, indicating that symptomatic low back pain patients have poor sleep quality. According to the findings of this study, the Insomnia Severity Index mean score for people with symptomatic low back pain was 20.46 out of 28 points, indicating clinical insomnia (moderate severity). In symptomatic low back pain patients with poor sleep quality, the pain level on the Visual Analog Scale was higher than in asymptomatic low back pain patients. As previously stated in this study, the mean score for symptomatic persons was 7.77 on a 10-point scale, while the mean score for asymptomatic individuals was 2.41. The gender distribution of patients in two groups of symptomatic and asymptomatic low back pain persons, demonstrating that males were more impacted than females according to this study.

We identified a considerable rate of sleep disturbance in patients with acute and chronic low back pain, showing that sleep disturbance does not evolve with time, but rather appears early in the disease. This finding also suggests that factors other than the length of pain can influence sleep disruption ratings. A variety of physiological and psychological problems have been related to sleep deprivation. These side effects could become more severe over time, leading to serious health problems like depression, obesity, type 2 diabetes, hypertension, and coronary artery disease [21][22].

Given the high prevalence of sleep disturbance in people with low back pain, as well as the potential consequences, it seems prudent to examine and manage sleep problems correctly. Patients with persistent pain were employed in previous studies on low back pain and sleep disturbance. Sleep disturbance was seen in a high percentage of individuals with acute and chronic low back pain, indicating that sleep disturbance does not develop over time but rather appears early in the disease. This study also demonstrates that variables other than the duration of discomfort might cause sleep disruption. Pain intensity is the feature of low back pain that is most likely to be linked to sleep disruption. Patients with low back pain who have sleep disturbance also report higher pain intensity than those who do not, according to previous studies [23][24].

The occurrence of sleep disorders has consequences for the treatment of LBP from a clinical standpoint. According to one study, LBP patients who had sleep disturbances were twice as likely as those who did not to be admitted to the hospital [25]. According to another study, better sleep quality may help individuals with arthritis manage their pain and symptoms during the day [26]. Due to the highly selected patient groups, such as the elderly, or specialised pain clinics, or small samples of chronic LBP, estimates of how common sleep disruption is among those seeking treatment for LBP currently do not show up [27][28]. These studies may provide prevalence figures for patients with LBP treatment which are not applicable for larger and more diverse groups [29]. Researchers will decide whether they should concentrate their efforts on the links between these illnesses in this group of patients based on high-quality data about the prevalence of sleep disturbances. The prevalence rate for patients with acute or chronic pain may differ and this may help to identify a group of patients at risk of chronic sleep problems. Finally it may lead to the development of treatments for both diseases by studying the relation between sleep and pain severity [30][31].

Finally, despite the large sample size, this research provided very important findings in the areas of LBP and sleep. Only one item was used to measure sleep disturbance that cannot offer a full picture of which sleeping aspects were interrupted. Furthermore, because our study was cross-sectional, we were constrained in our ability to

investigate causal links [32].

CONCLUSION

In this study, researchers discovered a link between poor sleep and low back discomfort. This research found that there is a bidirectional relationship between low back discomfort and poor sleep, with one affecting the other and vice versa. Sleep disturbances were shown to be very common in people with LBP, according to this study. Patients with both acute and persistent LBP are also having poor sleep problems. This finding also suggests that sleep disruption reports can be caused by factors other than pain duration. It's worth doing more research to see what factors are linked to sleep disturbance in Low back pain sufferers.

REFERENCES

1. Oliveira CB, Maher CG, Pinto RZ, et al., 2018. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. *European Spine Journal*. 27(11), Page 2791–803.
2. Rhon DI, O'Hagan E, Mysliwiec V, et al., 2019. Does Disordered Sleep Moderate the Relationship Between Pain, Disability and Downstream Health Care Utilization in Patients With Low Back Pain?: A Longitudinal Cohort From the US Military Health System. *Spine*. 44(21), Page 1481–91.
3. Heffner KL, France CR, Trost Z, et al., 2011. Chronic Low Back Pain, Sleep Disturbance, and Interleukin-6. *Clinical Journal of Pain*. 27(1), Page 35–41.
4. Maher C, Underwood M, Buchbinder R, 2017. Non-specific low back pain. *The Lancet*. 389(10070), 736–47.
5. Akshaya V. Saklecha, Tejaswini B Fating, Shruti Deshpande, et al., 2021. Effectiveness of pelvic floor exercises after subtotal hysterectomy and haematometra in a 39-year-old female with urinary incontinence: a case study. *Journal of Medical Pharmaceutical and Allied Science*, 10(3), Page 2770-2773.
6. Foster NE, Anema JR, Cherkin D, et al., 2018. Prevention and treatment of low back pain: evidence, challenges, and promising directions. *The Lancet*. 391(10137), Page 2368–83.
7. Morelhão PK, Kim LJ, Pinto RZ, et al., 2019. Should Physical Therapists Assess Sleep Quality in Patients Seeking Care for Low Back Pain? *Physical Therapy*. 99(8), Page 961–3.
8. Pinheiro MB, Morosoli JJ, Ferreira ML, et al., 2018. Genetic and Environmental Contributions to Sleep Quality and Low Back Pain: A Population-Based Twin Study. *Psychosomatic Medicine*. 80(3), Page 263–70.
9. Ganesan S, Acharya AS, Chauhan R, et al., 2017. Prevalence and Risk Factors for Low Back Pain in 1,355 Young Adults: A Cross-Sectional Study. *Asian Spine Journal*. 11(4), Page 610–7.
10. Bais A1, Kamble S, Bele A, et al., 2019. Prevalence of Mechanical Low Back Pain In Housewives. *Online International*

- Interdisciplinary Research Journal. 09(02), Page 90-93 .
11. Murase K, Tabara Y, Ito H, et al., 2015. Knee Pain and Low Back Pain Additively Disturb Sleep in the General Population: A Cross-Sectional Analysis of the Nagahama Study. *Plos One*. 10(10), e0140058.
 12. Silva AA da, Mello RGB de, Schaan CW, et al. , 2016. Sleep duration and mortality in the elderly: a systematic review with meta-analysis. *BMJ Open*. 6(2), e008119.
 13. Shi L, Chen S-J, Ma M-Y, et al., 2018. Sleep disturbances increase the risk of dementia: A systematic review and meta-analysis. *Sleep Medicine Reviews*. 40, Page 4–16.
 14. Gerhart JI, Burns JW, Post KM, et al., 2017. Relationships Between Sleep Quality and Pain-Related Factors for People with Chronic Low Back Pain: Tests of Reciprocal and Time of Day Effects. *Annals of Behavioural Medicine*. 51(3), Page 365–75.
 15. Herrero Babiloni A, De Koninck BP, Beetz G, et al., 2020. Sleep and pain: recent insights, mechanisms, and future directions in the investigation of this relationship. *Journal of Neural Transmission*. 127(4), Page 647–60.
 16. Mathias JL, Cant ML, Burke ALJ, 2018. Sleep disturbances and sleep disorders in adults living with chronic pain: a meta-analysis. *Sleep Medicine*. 52, Page 198–210.
 17. Haack M, Simpson N, Sethna N, et al, 2020. Sleep deficiency and chronic pain: potential underlying mechanisms and clinical implications. *Neuropsychopharmacology*. 45(1), Page 205–16.
 18. Vinstrup J, Jakobsen MD, Andersen LL, 2020. Poor Sleep Is a Risk Factor for Low-Back Pain among Healthcare Workers: Prospective Cohort Study. *International Journal of Environmental Research and Public Health*. 17(3).
 19. Afolalu EF, Ramlee F, Tang NKY, 2018. Effects of sleep changes on pain-related health outcomes in the general population: A systematic review of longitudinal studies with exploratory meta-analysis. *Sleep Medicine Reviews*. 39, Page 82–97.
 20. Auvinen JP, Tammelin TH, Taimela SP, et al., 2010. Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. *European Spine Journal*. 19(4), Page 641–9.
 21. Nemade S, Phansopkar P, Naqvi WM, 2021. Association of Poor Sleep with Low Back Pain among Symptomatic and Asymptomatic Population: A Research Protocol. *Indian Journal of Forensic Medicine & Toxicology*. 15(1), Page 335–40.
 22. Haack M, Mullington JM, 2005. Sustained sleep restriction reduces emotional and physical well-being. *Pain*. 119(1), Page 56–64.
 23. Yaggi HK, Araujo AB, McKinlay JB, 2006. Sleep Duration as a Risk Factor for the Development of Type 2 Diabetes. *Diabetes Care*. 29(3), Page 657–61.
 24. Fujii T, Matsudaira K, 2013. Prevalence of low back pain and factors associated with chronic disabling back pain in Japan. *European Spine Journal*. 22(2), Page 432–8.
 25. Naqvi W, Vaidya L, Kumar K, 2020. Impact of low back pain on fear of movement and functional activities. *International Journal of Research in Pharmaceutical Sciences*. 11(3), Page 4830–5.
 26. Kaila-Kangas L, Kivimäki M, Härmä M, et al., 2006. Sleep disturbances as predictors of hospitalization for back disorders-a 28-year follow-up of industrial employees. *Spine (Phila Pa 1976)*. 31(1), Page 51–6.
 27. Davis GC, 2003. Improved Sleep May Reduce Arthritis Pain. *Holistic Nursing Practice*. 17(3), Page 128–35.
 28. Marin R, Cyhan T, Miklos W, 2006. Sleep Disturbance in Patients With Chronic Low Back Pain. *American Journal of Physical Medicine & Rehabilitation*. 85(5), Page 430–5.
 29. O'Donoghue GM, Fox N, Heneghan C, et al., 2009. Objective and subjective assessment of sleep in chronic low back pain patients compared with healthy age and gender matched controls: a pilot study. *BMC Musculoskeletal Disorder*. 10(1), Page 122.
 30. Deshmukh MK, Phansopkar PA, Kumar K. Piriformis Tightness, Muscle Energy Technique, Stretching. Effect of Muscle Energy Technique on Piriformis Tightness in Chronic Low Back Pain with Radiation. *Journal of Evolution Medicine and Dental Sciences*. 39, Page 82-97.
 31. Alsaadi SM, McAuley JH, Hush JM, et al., 2011. Prevalence of sleep disturbance in patients with low back pain. *European Spine Journal*. 20(5), Page 737–43.
 32. Gaur V, Kapoor A, Phansopkar P, 2021. Short Term Effects of Muscle Energy Technique vs. Active Release Technique in Improving Hamstring Flexibility and Pain in Patients with Acute Anterior Cruciate Ligament (ACL) Tear - A Randomized Control Trial. *Journal of Evolution Medicine and Dental Sciences*. 10(03), Page 278-48.
 33. Poulami B, Deepali P, Waqar M. N, et al., 2021. Effect of Safe Patient Handling (SPH) program on rehabilitation outcomes and on safety of Physical Therapists in rural hospital: A randomized clinical trial. *Journal of Medical Pharmaceutical & Allied Sciences*. 10(5), Page 3610-3613.

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