Association of Poor Sleep with Low Back Pain among Symptomatic and Asymptomatic Population: A Research Protocol

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Abstract

Background and objectives- Low back pain (LBP) is the key contributor to ages of disability. Although Low back pain puts an immerse economic strain on healthcare services, this disease is responsible for impacting people's daily lives. Low back pain is a widely common illness impacting persons of all ages. Sleep is an intricate and fundamental organic element with the social objective of keeping up homeostasis by methods for various physiological frameworks. 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. Some studies show a bidirectional link between intensity of pain and sleep quality. Recent attention to the combination of inflammatory processes in pain on the one side and sleep on the other, contributes to neuro-immunological mechanisms that may contribute to the near connection between pain and sleep.

Aim and objectives- To study association of poor sleep with low back pain among symptomatic and asymptomatic population.

Materials and Method- All asymptomatic and symptomatic individuals with low back pain in the group between 35-50 years of age will fill the survey using Visual Analogue Scale (VAS) and Insomnia Severity Index Questionnaire, and further data will be analyzed.

Result- The parameters of outcome measures of both the group of low back pain individuals will be analysed using the statistical test namely students paired T-test.

Conclusion- Based on the previous studies we assume that there should be a positive association between both poor sleep and low back pain.

Key words- *Low back pain, sleep, Visual Analogue Scale, Insomnia Severity Index.*

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Introduction

Low back pain is the main contributor to ages of disability, affecting as many as 84% of all individuals at some point in their lives.[1]Low back pain (LBP) is characterized as pain between the costal margins and lower gluteal folds, which is typically followed with severe movement restriction, may be correlated with

leg-related pain ('leg pain') and may not be correlated with fracture, direct trauma or systemic diseases such as neoplastic, infectious, vascular, metabolic or endocrine related processes.[2]

Low back pain is a very common symptom. Low back pain is estimated to be the world's leading cause of disability and the sixth largest contributor to the global disease burden, suggesting a prevalence of 9.4%.[3] It occurs in high-income, middle-income, and low-income countries and all age groups from children to the elderly population. Globally, years lived with disability caused by low back pain increased by 54% between 1990 and 2015, mainly because of population increase and ageing, with the biggest increase seen in low-income and middle-income countries. Low back pain is now the leading cause of disability worldwide.[4]

Low back pain is a global concern which is growing slowly leading to population ageing. Low back pain can be said to affect all age groups and is commonly related to sedentary jobs, smoking and obesity.[5]

Non-specific LBP is characterized as LBP not induced by any familiar cause[6],[7] which accounts for 90–95 percent of LBP cases. Non-specific LBP is reported to have an eighteen percent incidence point.[6]

Although Low back pain puts an immerse economic strain on healthcare services, this disease is responsible for impacting people's daily lives. Low back pain is a widely common illness impacting persons of all ages. [6], [8]

In 2015 Global Burden of Disease Report, where illnesses are evaluated by how much hindrance they cause in ages lost with inability, Low back pain was positioned as world's biggest supporter of disability.[9],[10]

Despite billions of dollars invested and thousands of research articles written, low back pain remains the leading cause of disability worldwide, and treatment is only moderately successful. Epidemiological studies have shown that a significant proportion of patients with low back pain often have comorbidities such as depression and anxiety, which may worsen the condition along with other psychological factors and complicate treatment.[11]

LBP is a significant medical issue worldwide, due to its prevalence and its effects (physical, social, economic and emotional).[12]There are many factors contributing to LBP; however, it is often impossible to determine one specific cause. In a group of adults over eighteen years, most people have experienced at least one episode of acute LBP in their lifetime.[12]

Sleep plays a vital part in human development, metabolism, and cognitive and physical rehabilitation. Past findings have demonstrated that sleep deficiency and prolonged lack of sleep may have a detrimental effect on executive performance, thinking and memory, response rate, auditory alertness and mood. Insufficient sleep hours have also been shown to influence on metabolism and endocrine activity and awareness.[13]

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 populaces, is major cause for fatigue, high blood pressure, insulin resistance, cardio and vascular disease.[14]

Sleep disorder is a rising public health concern worldwide. It can be influenced by environmental, cultural and behavioural factors and is estimated to have a prevalence of 10 to 48%. Sleep deficiency and sleep disorders can increase the risk of chronic hypertension, overweight / obesity, cardiovascular disease and psychological issues, thereby impacting both the quality of sleep and the overall quality of life.[3]

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.[15],[16],[17] Poor sleep quality among people with chronic low back pain appears to be related to worse pain, affects poor physical function, and pain catastrophizing.[18].

Sleep is important and its deprivation will result in serious consequences. Experimental studies in healthy volunteers (without pain) have shown that induced sleep deprivation contributes to musculoskeletal pain and

enhanced pain sensitivity to noxious stimuli through either a decrease in sleep length or a disturbance in sleep architecture.[11]

Back pain and poor sleep quality are public health issues [3]. Sleep deprivation has created consideration as a risk factor to the outcomes for people with MSK pain disorders. Some studies show a bidirectional connection between pain and sleep quality [1],[19]. Recent attention to the association between inflammatory processes in pain, on the one side, and sleep, on the other, leads to neuro-immunological mechanisms which may lead to the close correlation between pain and sleep.[19]

Sleep recovery in healthy volunteers after a duration of prolonged sleep deprivation has also been shown to produce an analgesic effect close to that caused by non-steroidal anti-inflammatory drugs. In addition, improved sleep quality in patients with debilitating conditions, such as osteoarthritis and chronic musculoskeletal pain, is substantially associated with pain intensity reductions. Eventually, earlier work also shows a clear correlation between sleep disturbance and musculoskeletal pain production. A study in Finland found that sleep disruption is a good predictor of adolescents experiencing low back pain.[11]

Murase Kimihiko et. al. (2015) performed a study showing that an enormous example of everyone not just indicated a peak going rate of knee and LBP, yet in addition that LBP and knee were firmly connected to less sleep and poor sleep standard, independent of other elements.[15]

Min Chun Young et. al. (2018) performed a study that found the relation between self-respond sleeping period and musculoskeletal discomfort in the older Korean community by making use of the KNHANES dataset. This research, stated that excessive sleep period is prevalent in any musculoskeletal pain individuals and is more common in multiple site joint pain subjects.[20]

Vinstrup et Jonas. Al. (2019) records strong dose-response relationship between arbitrary baseline sleep ratings and low back pain follow-up risk for health care staff, with substantial correlations observed in both sensitivity tests. Taking into consideration the high incidence of musculoskeletal conditions in occupational health groups.[14]

Research investigating the effect of sleep disruption on low back pain severity have shown a substantial correlation between sleep quality and intensity of pain, exhaustion, subsequent-day function and psychological distress. Individuals with low back pain who have sleep issues and more extreme pain have also been reported to be at higher risk of being hospitalized for low back pain than people with good sleep quality. These findings suggest that poor quality of sleep may be associated with exacerbations of low back pain; however, no direct association has been measured in low back pain to date.[11]

A critical issue in standard clinical practice is that sleep disruptions make treatment of LBP more difficult, suggesting a greater risk for it to become chronic. Longitudinal routine practice studies would be useful in exploring this and in developing a potential research agenda in this area; If sleep disturbances were associated with a higher risk of LBP becoming chronic, it would make sense to routinely assess and potentially treat the quality of sleep in LBP patients (whether or not they are seeking care), and to develop randomized controlled trials to determine whether treating sleep disturbances improves the outcome of LBP treatment. [21]

Although it has been shown that poor sleep and LBP are associated, but a little scientific information is available between the association of poor sleep in asymptomatic individuals and symptomatic low back pain individuals and vice versa.

Objectives

- To evaluate effect of poor sleep on LBP
- To evaluate poor sleep association with low back pain in asymptomatic individuals

Methods

This study will be carried out at Ravi Nair Physiotherapy College, Musculoskeletal OPD, Sawangi (Meghe), Wardha, Maharashtra, India after approval from Institutional Ethics Committee of Datta Meghe Institute of Medical Sciences, Deemed to be University.

Study design: Observational study

Study setting: Ravi Nair Physiotherapy College, Musculoskeletal OPD, Sawangi (Meghe), Wardha, Maharashtra, India

Participant: All asymptomatic and symptomatic individuals with low back pain in the group between 35-50 years of age

Inclusion criteria

- Both male and females
- Age group 35-50 years
- Population with low back pain
- Asymptomatic population
- Population having baseline LBP

Exclusion criteria

- Low back pain with radiculopathy
- Chronic low back pain patients
- Patient on sedatives

VARIABLES

Outcome measures:

- Insomnia Severity Index
- Visual Analogue Scale

DATA SOURCE MEASUREMENT

- **Insomnia Severity Index** –The (ISI) contains seven items that measure insomnia 's severity and consequences, and all items are graded using a five-point Likert scale (0 = no problem; 4 = very severe problem). A total score is obtained after summing up all the responses and the total score ranges from 0 to 28, where 0–7 indicates insomnia, 8–14 indicates insomnia at the subthreshold, 15–21 indicates moderate insomnia, and 22–28 indicates severe insomnia.[22].Reliability for Insomnia Severity Index (intra-class correlation coefficient, $ICC_{2,1}$−0.84) (Pearson's coefficient r−0.45). [23]

- **Visual Analogue Scale –**The Visual Analog Scale (VAS) is a straight line of 10 cm with endpoints describing extreme limits such as 'no pain at all' and 'pain as severe as it may be.' On the line between the two endpoints the patient is asked to mark his pain level. The distance between 'no pain at all' and the mark determines then the pain of the subject[24]. It is a valid a reliable tool for rating low back pain. $r = 0.767$ to $r = 0.943$, $p = 0.000$. [25]

STUDY SIZE – 200

Group A – 100 Symptomatic low back pain individuals

Group B – 100 Asymptomatic individuals

Sampling technique is simple random method.

Procedure

Institutional ethical clearance will be obtained before beginning the study. 200 subjects, between the age group of 35-50 years with low back pain symptomatic and aged matched asymptomatic subjects from Ravi Nair Physiotherapy College and Musculoskeletal OPD will be explained about the study procedure based on the inclusion and exclusion criteria. A proper consent will be taken from the patients and the patients will be explained about the study. The patients who wish to participate in the study will be taken into isolation in order to respect their privacy. After the consent is taken, with sample size of 200 two groups will be divided i.e. Group A- 100 symptomatic low back pain individuals and Group B- 100 asymptomatic individuals. VAS ratings will be taken for Group A subjects having low back pain and Insomnia Severity Index scale will be evaluated for both the groups of symptomatic and asymptomatic individuals. Subjects will be asked to fill the questions with the answers best suited to them. Data will be collected and documented for data analysis.

Expected Result

The result would include if poor sleep is a risk factor for low back pain or vice versa i.e if both are associated with each other. Using the INSOMNIA SEVERITY INDEX (ISI) And VISUAL ANALOGUE SCALE (VAS) the study would be carried out. Once the study result is complete, statistical analysis will be analysed using paired T-test and presented in the form of research paper.

Discussion

The point of this study is to check the relationship of poor sleep with LBP among both symptomatic and asymptomatic people. In spite of the fact that in

numerous investigations some relationship between poor sleep and low LBP have been appeared, however an exceptionally low logical data is accessible which shows the relationship of poor sleep with asymptomatic people and symptomatic people and the other way around.

To draw a close attention, this research will look at the association between the two that is poor sleep and LBP and how they are associated which can be very helpful in treating the LBP cases. Even, to make sure that these factors like poor sleep if hampering the treatment for LBP. To check the relation between the both and to check if poor sleep leads to LBP or if LBP leads to poor sleep or if both are interlinked to each other using the Visual Analogue Scale and the Insomnia Severity Index.

Conflict of Interest- None

Funding support- None

References

1. Rhon DI, O'Hagan E, Mysliwiec V, Lentz TA. 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*. 2019;44(21):1481–1491. doi:10.1097/BRS.0000000000003114
2. Kovacs FM, Seco J, Royuela A, et al. The association between sleep quality, low back pain and disability: A prospective study in routine practice. *Eur J Pain*. 2018;22(1):114-126. doi:10.1002/ejp.1095
3. Scarabottolo CC, Pinto RZ, Oliveira CB, et al. Back and neck pain and poor sleep quality in adolescents are associated even after controlling for confounding factors: An epidemiological study. *Sleep Sci*. 2020;13(2):107-112. doi:10.5935/1984-0063.20190138
4. Hartvigsen J, Hancock MJ, Kongsted A, et al. What low back pain is and why we need to pay attention. *The Lancet*. 2018;391(10137):2356-2367. doi:10.1016/S0140-6736(18)30480-X
5. Lumbalgia: un desafío global. *MPG J*. 2018;2(40). Accessed August 22, 2020. http://mpgjournal.mpg.es/index.php/journal/article/view/87
6. Oliveira CB, Maher CG, Pinto RZ, et al. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. *Eur Spine J*. 2018;27(11):2791-2803. doi:10.1007/s00586-018-5673-2
7. Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *The Lancet*. 2017;389(10070):736-747. doi:10.1016/S0140-6736(16)30970-9
8. A systematic review of the global prevalence of low back pain - Hoy - 2012 - Arthritis & Rheumatism - Wiley Online Library. Accessed March 2, 2020. https://onlinelibrary.wiley.com/doi/full/10.1002/art.34347
9. Morelhão PK, Kim LJ, Pinto RZ, Tufik S, Andersen ML. Should Physical Therapists Assess Sleep Quality in Patients Seeking Care for Low Back Pain? *Phys Ther*. 2019;99(8):961-963. doi:10.1093/ptj/pzz058
10. Pinheiro MB, Morosoli JJ, Ferreira ML, et al. Genetic and Environmental Contributions to Sleep Quality and Low Back Pain: A Population-Based Twin Study. *Psychosom Med*. 2018;80(3):263–270. doi:10.1097/PSY.0000000000000548
11. Alsaadi SM, McAuley JH, Hush JM, et al. Poor Sleep Quality Is Strongly Associated With Subsequent Pain Intensity in Patients With Acute Low Back Pain. *Arthritis Rheumatol*. 2014;66(5):1388-1394. doi:10.1002/art.38329
12. Uchmanowicz I, Kołtuniuk A, Stępień A, Uchmanowicz B, Rosińczuk J. The influence of sleep disorders on the quality of life in patients with chronic low back pain. *Scand J Caring Sci*. 2019;33(1):119-127. doi:10.1111/scs.12610
13. Mah CD, Kezirian EJ, Marcello BM, Dement WC. Poor sleep quality and insufficient sleep of a collegiate student-athlete population. *Sleep Health*. 2018;4(3):251-257. doi:10.1016/j.sleh.2018.02.005
14. Vinstrup J, Jakobsen MD, Andersen LL. Poor Sleep Is a Risk Factor for Low-Back Pain among Healthcare Workers: Prospective Cohort Study. *Int J Environ Res Public Health*. 2020;17(3). doi:10.3390/ijerph17030996
15. Murase K, Tabara Y, Ito H, et al. Knee Pain and Low Back Pain Additively Disturb Sleep in the General Population: A Cross-Sectional Analysis of the Nagahama Study. *PLoS ONE*. 2015;10(10). doi:10.1371/journal.pone.0140058
16. Silva AA da, Mello RGB de, Schaan CW, Fuchs FD, Redline S, Fuchs SC. Sleep duration and mortality in the elderly: a systematic review with meta-analysis. *BMJ Open*. 2016;6(2):e008119.

doi:10.1136/bmjopen-2015-008119

17. Shi L, Chen S-J, Ma M-Y, et al. Sleep disturbances increase the risk of dementia: A systematic review and meta-analysis. *Sleep Med Rev*. 2018;40:4-16. doi:10.1016/j.smrv.2017.06.010
18. Gerhart JI, Burns JW, Post KM, et al. Relationships Between Sleep Quality and Pain-Related Factors for People with Chronic Low Back Pain: Tests of Reciprocal and Time of Day Effects. *Ann Behav Med*. 2017;51(3):365-375. doi:10.1007/s12160-016-9860-2
19. Heffner KL, France CR, Trost Z, Mei Ng H, Pigeon WR. Chronic Low Back Pain, Sleep Disturbance, and Interleukin-6. *Clin J Pain*. 2011;27(1):35-41.
20. Chun MY, Cho B-J, Yoo SH, Oh B, Kang J-S, Yeon C. Association between sleep duration and musculoskeletal pain. *Medicine (Baltimore)*. 2018;97(50). doi:10.1097/MD.0000000000013656
21. Kovacs FM, Seco J, Royuela A, et al. The association between sleep quality, low back pain and disability: A prospective study in routine practice. *Eur J Pain*. 2018;22(1):114-126. doi:10.1002/ejp.1095
22. Lin C-Y, Cheng ASK, Nejati B, et al. A thorough psychometric comparison between Athens Insomnia Scale and Insomnia Severity Index among patients with advanced cancer. *J Sleep Res*. 2020;29(1):e12891. doi:10.1111/jsr.12891
23. Veqar Z, Hussain ME. Validity and reliability of insomnia severity index and its correlation with pittsburgh sleep quality index in poor sleepers among Indian university students. *Int J Adolesc Med Health*. 2017;0(0). doi:10.1515/ijamh-2016-0090
24. Haefeli M, Elfering A. Pain assessment. *Eur Spine J*. 2006;15(Suppl 1):S17-S24. doi:10.1007/s00586-005-1044-x
25. Yakut E, Bayar B, Meriç A, Bayar K, Yakut Y. Reliability and validity of reverse visual analog scale (right to left) in different intensity of pain. *Pain Clin*. 2003;15(1):1-6. doi:10.1163/156856903321196429