

The Relationship Between Sitting Duration and the Incidence of Low Back Pain Among Bus Drivers

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Submition : 2025-08-21; Accepted : 2025-12-11; Published : 2026-01-01

ABSTRACT

Introduction: The job of a bus driver requires sitting for long periods in a static position within a confined workspace. This condition poses a risk of musculoskeletal disorders, especially low back pain (LBP), which is caused by high biomechanical stress on the spine. LBP is one of the most common complaints among informal sector workers such as drivers, who often neglect occupational safety and health factors. This can occur due to prolonged sitting without breaks and non-ergonomic sitting positions, which may lead to muscle fatigue and lower back pain. This study aimed to determine the relationship between sitting duration and the incidence of low back pain among bus drivers. **Methods:** This research was an observational study with a correlational approach. A sample of 91 respondents was selected using random sampling from a total population of 118 bus drivers at the Giri Adipura Terminal, Wonogiri. Data were collected using questionnaires and lower back pain examinations with the Lasegue Test and palpation. The data were analyzed using the Spearman test with SPSS version 25. **Results:** The majority of respondents (85.7%) had a sitting duration of 5–8 hours per day. The Spearman test results showed that there was no significant relationship between sitting duration and the incidence of low back pain (p -value = 0.052; $p > 0.05$). This is because the drivers demonstrated high awareness of occupational health by regularly performing stretching exercises and maintaining proper posture while driving. In addition, the company paid attention to driver comfort and occupational health by providing ergonomic seats and adequate rest schedules. These facilities help reduce biomechanical stress on the spine and support a healthier working condition for drivers. **Conclusion:** This study shows that there is no significant relationship between sitting duration and the incidence of low back pain among bus drivers.

Keywords: low back pain, sitting duration, bus drivers

ISSN 2722 – 9610
E –ISSN 2722 - 9629

INTRODUCTION

Sitting for long periods without taking breaks can affect the structure of the spine due to the biomechanical processes that occur in the vertebral column (Devira et al. 2021). This condition can increase the risk of musculoskeletal disorders such as low back pain (LBP), which is a common lower back ache. According to data (Pratama et al. 2019), LBP is the most common complaint compared to other musculoskeletal disorders, especially among informal workers. Jobs that pose a risk of low back pain include those with long working hours that require employees to sit for extended periods in a fixed sitting position (Atmaja and Ghurri 2023). The job of a bus driver requires sitting for long periods in a confined workspace with a mostly static position. A previous study by (Syafitri et al. 2023) showed that low back pain is commonly

experienced by drivers due to non-ergonomic sitting postures. The etiology of low back pain is divided into two factors: mechanical factors, which cause disorders in the lower back muscles known as myogenic low back pain and non-mechanical factors, such as neoplasms, infections, and inflammatory arthritis (Hadi and Hasmar 2021). According to (Rahmawati 2021) the risk factors for low back pain include internal factors, such as age, sex, body mass index, and smoking habits, and external factors, such as physical activity and work-related aspects (working duration, workload, working posture, and length of service). Classified according to four criteria: duration (acute, sub-acute, and chronic), cause (specific and non-specific), pain characteristics (mechanical pain, radicular pain, and non-specific pain), and severity level (mild, moderate, and severe). Specific tests such as the



Lasegue Test and palpation can be performed (Nooryana and Setyawan 2021). Pain assessment can also be conducted using the Numeric Pain Rating Scale (NPRS), which usually ranges from 0 to 10, with each number indicating a different level of pain intensity. This study is important due to the high incidence of LBP among drivers and the low awareness of workplace ergonomics (Klaudia et al. 2020). By understanding the relationship between sitting duration and LBP, the findings of this study are expected to contribute to preventive and promotive occupational health efforts for bus drivers.

METHODS

This study was an analytical observational study with a cross-sectional approach. The study population consisted of all intercity bus drivers (AKAP) at the Giri Adipura Terminal, Wonogiri, totaling 118 drivers. A sample of 91 respondents was selected randomly using the Slovin formula with a 5% margin of error. Data were collected using a personal data questionnaire, the Numeric Pain Rating Scale (NPRS) to measure pain, and physical examinations including the Lasegue Test and palpation. The study was conducted from January 4 to 15, 2025. The independent variable was sitting duration, and the dependent variable was the incidence of low back pain (LBP). Data were analyzed using the Spearman Rank test with SPSS version 25. Univariate analysis was used to describe the characteristics of the respondents, while bivariate analysis was used to test the relationship between variables.

RESULTS

a. Age

Table 4. Research Data Based on Age

Age Group	N	Percentage (%)
Adolescents (18–25 years)	2	2.2%
Adults (26–45 years)	47	51.6%
Elderly (46–65 years)	41	45.1%
Senior (>65 years)	1	1.1%
Total	91	100%

Based on Table 4, it can be seen that the respondents with the highest age frequency were adults aged 26–45 years (51.6%), followed by

elderly respondents aged 46–65 years (45.1%), adolescents aged 18–25 years (2.2%), and seniors aged over 65 years (1.1%).

b. Sex

Table 5. Research Data Based on Sex

Sex	N	Percentage (%)
Male	91	100%
Total	91	100%

Based on Table 5, it can be seen that all respondents were male (100%).

c. Low BackPain

Table 6. Research Data Based on Low Back Pain

Pain Level	N	Percentage (%)
No Pain	65	71.4%
Mild Pain	24	26.4%
Moderate Pain	2	2.2%
Severe Pain	0	0.0%
Total	91	100.0%

Based on Table 6, it can be seen that 71.4% of respondents did not experience pain, 26.4% experienced mild pain, and 2.2% experienced moderate pain.

d. Length of Service

Table 7 Research Data Based on Length of Service

Length of Service	N	Percentage (%)
<4 Years	15	16.5%
≥4 Years	76	83.5%
Total	91	100%

Based on Table 7, it can be seen that 16.5% of respondents had worked for less than 4 years, while 83.5% had worked for 4 years or more.



e. Body Mass Index (BMI)

Table 8. Research Data Based on Body Mass Index

BMI Category	N	Percentage (%)
Underweight (<18.5)	3	3.3%
Normal (18.5–22.9)	21	23.1%
Overweight (23–24.9)	18	19.8%
Obese I (25.0–29.9)	35	38.5%
Obese II (>30)	14	15.4%
Total	91	100%

Based on Table 8, it can be seen that most respondents had a Body Mass Index (BMI) in the Obese I category (38.5%), followed by Normal (23.1%), Overweight (19.8%), Obese II (15.4%), and Underweight (3.3%).

f. Smoking

Table 9. Research Data Based on Smoking

Smoking Status	N	Percentage (%)
Yes	77	84.6%
No	14	15.4%
Total	91	100%

Based on Table 9, it can be seen that 84.6% of respondents were smokers, while 15.4% were non-smokers.

g. Correlation of Sitting Duration

General respondent data on sitting duration was divided into three categories: <4 hours, ≥5–8 hours, and >8 hours. The distribution of respondent data is presented as follows:

Table 10. Research Data Based on Sitting Duration

Sitting Duration	N	Percentage (%)
<4 Hours	4	4.4%
≥5–8 Hours	78	85.7%
>8 Hours	9	9.9%
Total	91	100%

Based on Table 10, it can be seen that 4.4% of respondents had a sitting duration of less than 4 hours, 85.7% had a sitting duration of 5–8 hours, and 9.9% had a sitting duration of more than 8 hours.

DISCUSSION

Low back pain (LBP) is one type of musculoskeletal disorder that occurs in the lumbar region. This condition is characterized by muscle tension, stiffness, and a disturbing pain sensation. Generally, the pain arises due to certain diseases or poor body posture while working. The results of this study do not fully align with the findings of most previous studies, which state that prolonged sitting is one of the main causes of LBP. This discrepancy can be explained by several conditions observed in the field, including:

a. Drivers' Ergonomic Awareness

Drivers' awareness of the importance of maintaining proper body posture while working has shown a significant increase (Adienugraha et al. 2024) Many drivers have developed the habit of performing light stretching exercises when stopping or taking breaks at terminals. Although sitting duration is quite long, these compensatory activities help reduce biomechanical stress on the spine and prevent pain.

b. Supportive Bus Facilities

Transportation companies have improved bus facilities, including ergonomically designed seats, the provision of rest beds, and the implementation of air suspension technology. This technology effectively dampens repetitive road vibrations that could otherwise cause micro-injuries to spinal tissues, thereby lowering the risk of LBP (Kurniati et al. 2019). A study by (Anggara and Windusari 2024) also showed that buses equipped with air suspension produce lower vibration levels, especially in the driver's seat area. In addition, the use of toll roads with smoother surfaces further reduces vibration intensity compared to damaged or uneven roads (Jannah et al. 2023) This combination decreases mechanical stress on the spine, even when drivers sit for extended periods (Hadi and Tjhin 2024).

c. Driver's Seat Design

The driver's seat is an essential ergonomic element that contributes to comfort and the prevention of LBP. A poorly designed seat can lead to improper body posture, add stress to spinal structures, and accelerate lower back muscle fatigue. An ideal seat should have a



backrest that supports the natural curvature of the spine, especially the lumbar lordosis. In addition, adjustable features for seat height, depth, and tilt are crucial for maintaining optimal posture (Adriazni and Al-Irsyad 2021).

d. Rotational Work System and Rest Time

Intercity bus (AKAP) drivers generally work in a shift system, with each bus having two drivers who take turns driving for about 4–5 hours out of a total journey of 8–10 hours. When off-duty, drivers can rest inside the bus using facilities such as beds, pillows, and dedicated resting areas (Belia and Handayani 2020). Adequate rest time allows for muscle recovery and reduces the biomechanical load caused by prolonged sitting, thereby lowering the risk of developing LBP (Ghasemi et al. 2020).

CONCLUSION

Based on the results of the study on “the relationship between sitting duration and the incidence of LBP among bus drivers,” it was found that there was no significant relationship between sitting duration and LBP, with a significance value of $p = 0.052$.

ACKNOWLEDGEMENT

Acknowledgements are extended to Mrs. Warih Anjari D.K. and Mr. Diyono for their assistance in the research process, and sincere thanks to all parties who were involved in this study.

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