Whole Body Vibration Exposure of Long-Haul Truck Driving
Exposure Assessment

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Introduction

- Low back pain is a leading cause of lost productivity in the workplace as it can make up a significant portion of costs for the U.S. worker’s compensation claims.
- Low back pain is one of the most significant non-lethal conditions which can lead to chronic disability.
- Whole body vibration has been associated with occupational low back pain.

Methods

- Accelerometers were used to measure WBV on 3 different axes.
- Data was divided into 2 segments: Moving only and Moving + nonmoving.
- Observed 2 parameters:
  - Root mean square:
    \[ A_w = \sqrt{\frac{1}{T} \int_{0}^{T} a^2(t) dt} \]
  - Vibration dose value (VDV)
    \[ VDV = \int_{0}^{T} a^2(t) dt \]
- Processed full shifts into varying time segments (minutes):
  - 5, 7.5, 10, 15, 30, 60, 120, 240, 480
- Repeated ANOVA analysis to find Least Square Means

Results

- Figure 1: Least Square Means: Aw Z-axis
- Figure 2: Tukey HSD Test
- Figure 3: Aw by Axis
- Figure 4: VDV by Segment

Discussion

- Aw is established to be associated with higher prevalence of occupational low back pain.
- The EU establishes the current standard of measurement to be 480 minutes.
- This study suggests that a measurement duration of 60 minutes or longer may not be statistically different than measurements taken for 480 minutes.
- VDV is a cumulative measure that is typically normalized to an 8-hr time period.
- Data from Moving only segments were lower than comparable data in Moving + Nonmoving segment.
- Moving only segment is likely more accurate to measure VDV impulse vibration exposure.

Conclusion

- Further studies are warranted to establish short, reliable measurement durations for Aw and VDV.
- The measurement duration may be decreased to 60 minutes with consistent accuracy.
- The active seat may statistically reduce measures of WBV.

References or Acknowledgements

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