

Validation of the Relationship between Lumbar Posture Change and Long Time Driving Fatigue Using Lumbar Support

Takumi Yamakawa ¹⁾ Riku Inden ²⁾ Naohiro Tanase ²⁾ Soichiro Hayakawa ²⁾

Ryojun Ikeura ²⁾ Masami Yoshida ¹⁾ Hideo Tobata ¹⁾

¹⁾ Tachi-s, Co., Ltd.

1-3-1 Suehiro-cho Ome-shi, Tokyo, 198-0025, Japan (E-mail:ta-yamakawa@tachi-s.co.jp)

²⁾ Mie University, Graduate School of Engineering

1577 Kurimamatiya-cho Tsu-shi, Mie, 514-8507, Japan

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The theme of our study is to reduce seating fatigue accumulation of a driver during long time driving. Physical fatigue of a driver during long time driving is caused by poor blood circulation due to maintaining the same posture. In order to reduce seating fatigue accumulation of a driver during long time driving, we focused on changing the posture of a driver by using lumbar support device periodically. However, previous studies have not clarified what kind of posture change is effective in reducing fatigue. Therefore, in this paper, we used our originally developed lumbar posture measurement device to measure lumbar posture change. By comparing these results with the results obtained from the evaluation of long time driving fatigue, we aimed to derive the lumbar posture change and lumbar support position that can reduce driver seating fatigue during long time driving. In this study, an air cell lumbar support device was used to change the lumbar posture of the participants. We set three support positions : B120 (120 mm above SRP), B150 (150 mm above SRP) and B180 (180 mm above SRP). The participant is a man in his twenties. From the measurement results, it showed that the posture change was remarkable when the support position was set at B150(L3) of participant both seating evaluation and long time driving experiments. Then, we evaluated the seating fatigue of driver for a long time driving by using objective evaluation and subjective evaluation. One experimental time was 90 minutes. From the results of objective evaluation using final value of muscle fatigue curve and final value of subjective evaluation on the participant, the fatigue accumulation reducing effect was confirmed at B150(L3) support with the lumbar support device. These results showed that the support of the lumbar spine near L3 causes remarkable posture changes in the driver and effective in reducing fatigue.

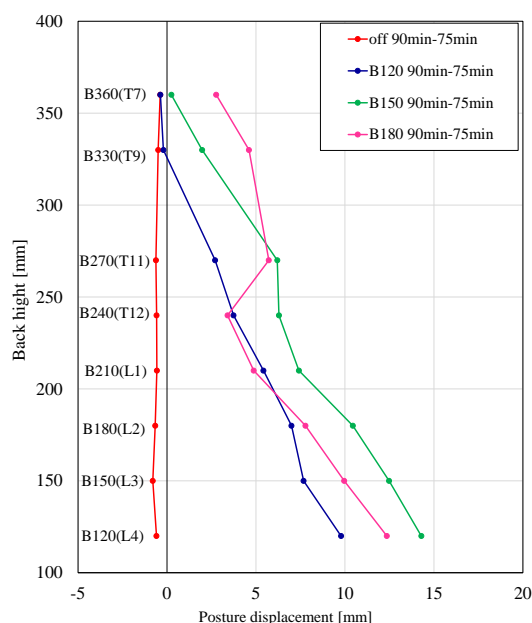


Fig.1 Postural displacement during long time driving

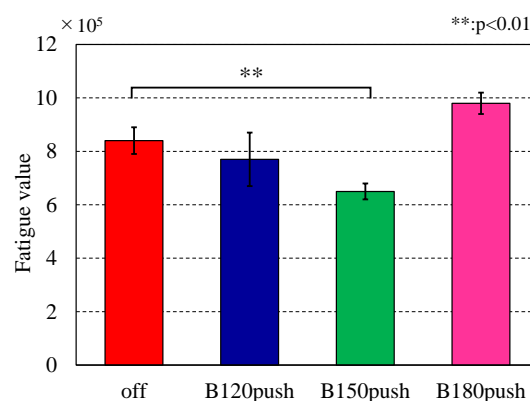


Fig.2 Significant difference test result at 90 minutes