

Effect of low back pain on social and professional life of drivers of Kolkata

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Abstract Occupational driving has often been associated with a high prevalence of back pain. Buses constitute the backbone of the local transportation; so many people are engaged in the profession. The present study was to investigate the prevalence of low back pain (LBP) and due to that problem whether their social and professional life hampers or not. The present study was undertaken among 160 government undertaking male bus drivers. Modified Nordic musculoskeletal questionnaire was performed with physical assessment. Then Oswestry Low Back Pain Disability Questionnaire (QLBPDQ) was performed to evaluate the extent to which social and professional life is restricted by back pain. Afterwards, the sit-and-reach test and investigation of sitting postures was done. From the analysis of questionnaire it was revealed that drivers had to spend 8-10 hours daily for 6 days in a shift. It was further observed that all of them mainly suffering from LBP. From the QLBPDQ analysis it was found that LBP restricted their social and professional life. Sit and reach test and posture analysis also support this finding. This result is an absolute reflection of the alarming situations of the Kolkata bus drivers. It can be concluded that the bus drivers are highly stressed due to the hazardous working conditions, which in turn may additionally affects their health and overall work performance in the long run.

Keywords: bus drivers; low back pain, social life, professional life, stressed

1. Problem description

Professional drivers have been found to be at high risk for developing LBP. Several studies have suggested that back injuries occurs due to ergonomic risk factors such as awkward postural stress, repeated and forceful motions, prolonged working time in constant sitting and long-term exposure to whole body vibration as well as psychosocial factors, such as high quantitative job demands, low coworker support, psychological job demands, and job dissatisfaction [1, 7,10].

Like many other passenger transport industries, the safety of travelers and other road users is of prime importance. Bus drivers must successfully balance the competing demands of safety, customer-focused service and company operating regulations. The physical and psychological health of the bus driver is a critical factor in driving performance.

Occupational drivers such as bus drivers are one group of workers who have been reported widely as being at an increased risk for LBP. It has been estimated that men who spend over half of their working time by driving a motor vehicle have about three times higher probability to get lumbar disc herniation [6]

The intra-city short distance bus drivers of Kolkata cover distances through highly congested roads and have to remain alert all the time. This in turn poses an additional hassle for the drivers. Moreover they often drive buses fully loaded with commuters, which is also another hazard in terms of deviation of concentration. On consideration of the given nature of their work and their potential for back problems, these bus drivers represent a particularly interesting group for study. The present study was to investigate the prevalence of low back pain (LBP) among

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professional urban bus drivers and due to that problem whether their social and professional life hampers or restricted.

2. Methodological formulation

Selection of subjects

In the present investigation, government 160 male bus drivers, having more than five year of experience, of three different short distance buses were selected randomly.

One of the short distance buses (No. 9A) traversed from Dunlop to Ballyganj covering a distance of 18 km within the city of Kolkata. Thus one full trip of the bus involves distance coverage of 36 km.

The second short distance bus (No. S32) traversed from Barakpur to Howrah covering a distance of 18 km within the city of Kolkata. Thus one full trip of the bus involves distance coverage of 40 km.

Government buses of Kolkata and bus drivers

Government bus includes one driver and one conductor and there is only one gate for entry and exit of passengers. They work in shifts—either morning, day or night, average duration 8 hours per shift but most of the time extended up to 10 hours. They undertake 2-3 trips each day where one trip means to and fro journey i.e., starting from the depot to the final destination and return to the depot. They also get fixed monthly salary for their job, which is paid by the government and they are entitled to periodic increments as per government rules. Moreover they also enjoy regular leave benefits, get ESI facilities, annual incentives and can also alter their shifts in case of emergency or otherwise health reasons.

Bus driver are experience a high ambient temperature and high humidity level in mainly summer season and usually exposed to high noise level. They are assist by the conductors regularly while passing through congested roads and junction points. They are very careful when people are either getting down or alighting the bus and has to remain in the gate for this purpose particularly for children, women and aged people. All these make their work extremely hectic and stressful.

Measurement of physical parameter

The height and weight of the bus drivers were measured by an anthropometer (Martin's Anthropometer) and "Crown" weighing machine (Mfg. by Raymon Surgical Co.) respectively. The Body Surface Area (BSA) [11] and Body Mass Index (BMI) [2,13] of all the subjects were also computed.

Questionnaire Study

A detailed study based on Modified Nordic Questionnaire information about LBP (current—pain in immediate past 7 days and previous—pain in the last 12 months)[4] was performed on the Experimental group. The questionnaire consists of a series of objective-type questions with multiple-choice responses.

Those regarding posture were in terms of five different possible configurations of the torso (torso against backrest, torso straight, torso bent, torso twisted, and torso bent and twisted simultaneously) and three possible frequencies of occurrence (never, occasionally, and often). In these respects, driving posture stress was evaluated for each respondent. Firstly, severity scores were allocated to the postures and frequencies of occurrence as follows: torso against backrest—1, torso straight—2, torso bent—3, torso twisted—4, torso bent and twisted simultaneously—5; Never—0, occasionally—1, often—2. Secondly, a posture score was computed as the sum total of posture severity and frequency severity scores. [8]

Observational study

Drivers were observed in their assigned duty, i.e., service route driving over the duration of one complete round trip—to and fro. The drivers were observed in their sitting dynamic posture (i.e., torso against backrest, torso straight, torso bent, torso twisted, torso bent and twisted simultaneously), which was noted and recorded once in every minute.

Sit and reach test for back and hamstring muscle flexibility

The sit-and-reach test followed the standardized testing procedures for evaluating the hamstrings and lower back flexibility [3]. All the workers were informed about the protocol of the test. The subject's heels should be placed against the edge of the sit and reach box. The subject should slowly reach forward with both hands as far as possible. Fingertips can be overlapped and should be in contact with the box. The score is the most distance (in cm) reached with the fingertips. The best of three trials was recorded.

Oswestry Low Back Pain Disability Questionnaire

This is a self-report questionnaire [5]. The questionnaire is divided into 10-sections (Pain Intensity, Personal Care, Lifting, Walking, Sitting, Standing, Sleeping, Sex Life, Social Life and Traveling) and each section has 6 possible answers. Statement 1 is graded as 0 points; statement 6 is graded as 5 points. After you have finished the Questionnaire, add up your points, divide that number by 50, and multiply by 100 to get your percent disability. If one section is missed or not applicable the score is calculated by total possible score. The following interpretation scores are excerpted from the developers of the Oswestry system.

- i. 0% to 20%: Minimal disability
- ii. 20%-40%: Moderate disability
- iii. 40%-60%: Severe disability
- iv. 60%-80%: Crippled
- v. 80%-100%

Statistical analysis

The mean and standard deviation of the various physical parameters were calculated. The differences in ergonomic and psychosocial factors between groups with and without LBP were examined by a χ^2 test and the associations were described by the odds ratio with 95% confidence interval.

3. Experiment

Altogether 160 bus drivers successfully completed the questionnaire and physical assessment. Finally the obtained information's were tabulated in various headings. 117 of them having low back pain was selected for further study, viz., for measurement of sit and reach test and detailed posture analysis. The results of the questionnaire interview were examined in the following three aspects:

Individual and work characteristics of participant drivers

Demographic factors relating to the study population, including age, weight and stature, year of experience are given in Table 1.

The results of the mean age (35.77 ± 7.66), stature (162.86 ± 5.16), weight (52.98 ± 6.8), BMI (19.95 ± 2.23) and BSA (1.61 ± 0.11) of the bus drivers suggest that the workers had a normal range of physiological features. The mean year of experience of the bus drivers was 11.07 ± 6.98 .

Table 1
Demographic details for 160 Bus drivers who participated in the study

| Variable | Range | Mean | ±SD |
|--------------------------|-------------|--------|------|
| Age (years) | 25-56 | 35.77 | 7.66 |
| Stature (cms) | 153-172.5 | 162.86 | 5.16 |
| Weight (kgs) | 42-73 | 52.98 | 6.8 |
| BMI (kg/m ²) | 16.22-24.03 | 19.95 | 2.23 |
| BSA (m ²) | 1.44-1.92 | 1.61 | 0.11 |
| Industry Experience | 5-29 | 11.07 | 6.98 |

Questionnaire study

a) Musculoskeletal disorder (low back pain)

Participants were asked to identify body areas that they have experienced discomfort in the past 12 months, using the Modified Nordic Questionnaires. From the questionnaire analysis it was found that low back region was the most affect part and workers facing many problems due to that discomfort (Table 2). The results of a comparison between drivers with and without LBP regarding comfort of the workstation and psychosocial stressing factors are shown in Table 2. Drivers with LBP more frequently complained of uncomfortable seats (OR 2.9, 95% CI 1.4–6.1), uncomfortable back support (3.4, 1.5–7.6)

and whole body vibration (4.8, 1.6–14.62). Regarding psychosocial stressing factors, there was a significantly higher proportion of complaints in the LBP group about having a prolong working time (3.3, 1.5–7.0), inadequate rest period during a working day (3.5, 1.5–8.4). There was no difference in complaints or other psychosocial stressing factors between groups. LBP typically lasting between hours to few minutes followed by 1-2 days and generally attributable to muscle pain then stiffness and sprain was suffered by the bus drivers. Workers suffered from severe pain mainly during rest followed by during working condition and sleeping at night.

Table 2
Self-perceive occupational risk factors due to Workstation and Work Organization Stress Factors

| Predictors | Drivers with LBP (N=117) | | Drivers without LBP (N = 43) | | .2 | Pvalue | OR | 95% CI |
|---|--------------------------|------|------------------------------|------|-------|--------|------|------------|
| | n | % | n | % | | | | |
| Workstation Factors | | | | | | | | |
| Uncomfortable seat | 72 | 61.5 | 15 | 35.9 | 7.96 | 0.05 | 2.98 | 1.44-6.19 |
| Uncomfortable back support | 60 | 51.3 | 10 | 23.3 | 8.93 | 0.04 | 3.47 | 1.57-7.690 |
| Uncomfortable steering wheel | 19 | 16.2 | 13 | 30.2 | 0.01 | 0.90 | 1.22 | 0.42-3.54 |
| Whole body vibration | 39 | 33.3 | 04 | 9.3 | 8.06 | 0.05 | 4.87 | 1.63-14.62 |
| Work organization stressing factors | | | | | | | | |
| Prolong working time | 69 | 58.9 | 13 | 30.2 | 9.278 | 0.02 | 3.32 | 1.57-7.01 |
| Inadequate rest period during the working day | 57 | 48.7 | 09 | 20.9 | 8.90 | 0.03 | 3.58 | 1.58-8.14 |
| Traffic jam on bus route | 33 | 28.2 | 07 | 16.3 | 1.79 | 0.18 | 2.02 | 0.81-4.99 |
| Lack of support from the higher Authority | 27 | 23.1 | 05 | 11.6 | 1.91 | 0.17 | 2.28 | 0.81-6.36 |
| Exposure to passenger hostility | 21 | 17.9 | 04 | 9.3 | 0.28 | 0.59 | 1.58 | 0.50-4.99 |
| Lack of accessibility to the restroom | 29 | 24.8 | 06 | 13.9 | 1.57 | 0.21 | 2.03 | 0.77-5.30 |

(P < 0.05) p value based on the χ^2 . OR = odds ratio; 95% CI = 95% confidence interval for the OR.

b) Oswestry low back pain disability questionnaire

Out of the 117 subjects interviewed, 57 of them had Moderate disability (48.7%). An equal

numbers (29 and 29) of workers had Severe (24.7%) and Minimal (24.7%) disabilities and remaining of them were Crippled (0.8%) (Figure1).

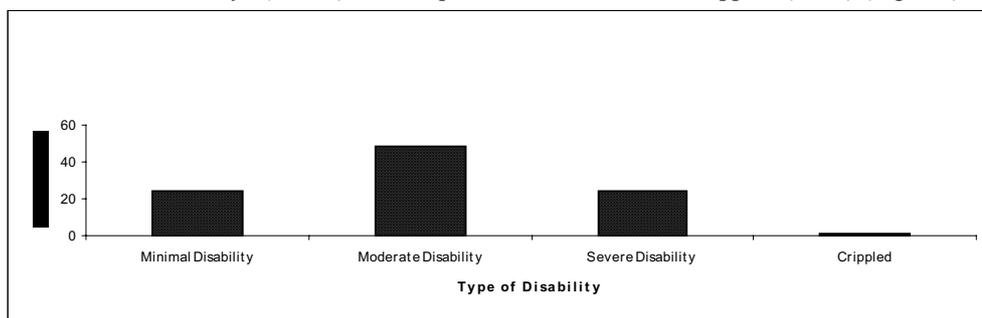


Figure 1. Interpretation of Oswestry Low Back Pain Disability Questionnaire scores

From the questionnaire analysis it was found that LBP restricted their social and professional life at a greater extent. The low back pain mainly restricted their sitting (89%) posture of extended period, social life (80%) and lifting (78%) activity, standing (65%)

of long period and traveling (65%) (Figure 2). This result is an absolute reflection of the alarming situations of the bus drivers.

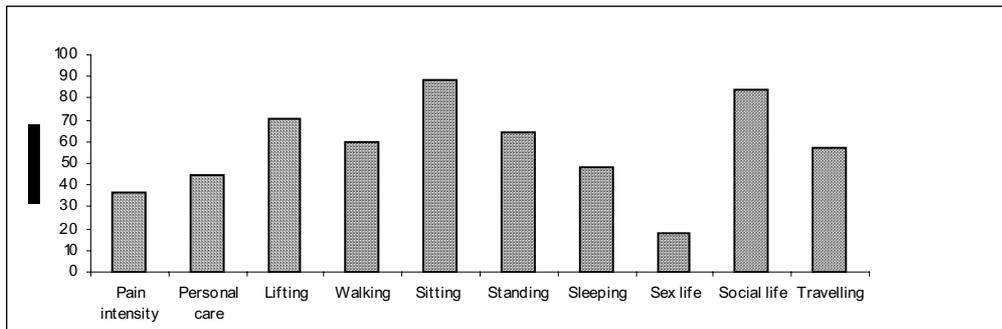


Figure 2. Interpretation of Oswestry Low Back Pain Disability Questionnaire each sections scores

Dynamic posture and sit and reach test analysis

Out of 117 bus drivers suffering from back problems, 30 were selected for further assessment of discomfort feeling. All of them experienced discomfort from sitting during driving. Few of these drivers needed to use a separate back support while driving the bus. According to the questionnaire analysis of postures reveals that twenty four (80 %) adapted ‘torso against backrest’, twenty seven (90%) indicated the ‘torso straight’ posture and ten drivers (33.3%) indicated that the ‘torso bent’ was often adopted during driving. Only six (20%) and five drivers (16.7%) respectively, indicated that the ‘torso

twisted’ posture and the ‘torso twisted and bent simultaneously’ posture were often adopted (Figure. 3 a).

From the observation of the drivers during driving, it was noted that the ‘torso straight’ postures were most often adopted followed by ‘torso bent’ and ‘torso on backrest’ and the ‘torso bent with twisted’ postures were least adopted posture by the drivers. They adopted the ‘torso bent with twisted’ postures when stationary, at T-junctions prior to moving into a major road from a minor road and from a minor road to main road (Figure. 3 b).

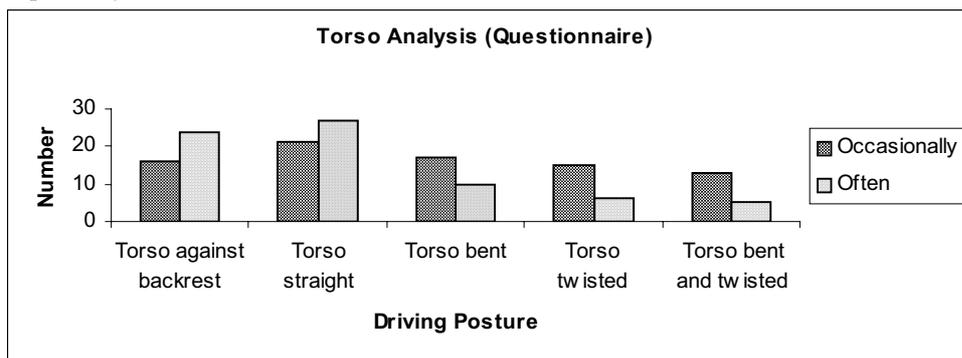
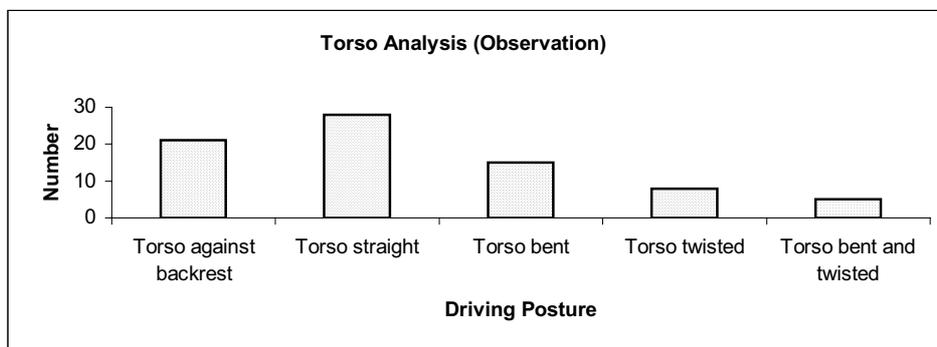


Figure 3: The summarized data for driving posture:
a) Questionnaire assessment (n=30)



b) Observation study (n=30)

Sit and reach test was also done to assess the low back flexibility of the bus drivers which was restricted due to musculoskeletal discomfort. The results showed that most of the workers have poor (62.1%) or

below average (31.6%) flexibility. No workers with excellent flexibility were found and few have average (24.6%) and above average (18.7%) flexibility (Table 3).

Table 3
Sit and Reach Test for Back and Hamstring Flexibility for the Bus Drivers (n=117)

| Category (Values in cm) | No of subjects in each category | Range |
|--------------------------|---------------------------------|------------|
| Excellent >17 | 0 | - |
| Above average (6 to 16) | 16 (18.7 %) | 6 to 8.5 |
| Average (0 to 5) | 21 (24.6 %) | 3 to 5 |
| Below average (-8 to -1) | 27 (31.6 %) | -2 to -6 |
| Poor (< -20) | 53 (62.1 %) | -18 to -22 |

(% given within parenthesis)

4. Critical evaluation and conclusion

On completion of the study, it is revealed that in the State buses the staff members include one conductors and a driver. Since these buses constitute the backbone of the local transportation for the common man in the city, so a large number of them run throughout the city in various routes.

These drivers are more stressed out while passing through congested roads and junction points. They are to be very careful when people are either getting down or alighting the bus particularly for children, women and aged people. Thus in spite of all odds, they continue their job relentlessly for hours maintaining constrained sitting postures. All these make their work extremely hectic and stressful.

Prevalence and nature of back problems in bus drivers

Data gathered in this study show that the majority of bus drivers experienced low back problems in the past 12 months. Therefore, the population must be considered 'at risk' and the questionnaire analysis showed that LBP typically lasting between hours to few minutes followed by 1-2 days and generally attributable to muscle pain, stiffness and sprain was suffered by the bus drivers. According to Dev *et al* [12] awkward and prolonged working postures was mainly associated with the development of musculo skeletal disorders (MSD). The development of musculoskeletal disorders (MSDs) largely relates to an

individual's physical development, as well as health status, psychosocial and physical workload. The results also showed that a large proportion of these complaints have been for more than one year, with many participants experiencing prolonged discomfort of five years or more. However, the majority of those with discomfort were still able to continue with their work.

The measurements of sit and reach test showed that no one of the bus drivers had full and symmetrical extents of movements in their backs. Clinically and theoretically it would be expected that those with chronic back pain should have decreased range of movements or decreased flexibility in hamstrings. From both the questionnaire evaluation and direct observation it is indicated that the drivers are exposed to postural stress and frequently adopted different types of postures according to their convenience. Firstly, while the questionnaire data indicated more frequent adoption of the 'torso against back rest' posture during driving than the 'torso straight' posture but the observation data, showed that the 'torso straight' posture was more frequently adopted than the 'torso against back rest' posture and some time "torso bent" and "torso twisted" (Fig. 3). Irrespective of the concerns identified, it is clear from the results that bus drivers are typically exposed to prolonged holding of the torso straight or unsupported, prolonged working hours and excessive job stress along with exposed to vibration and bad road conditions.

Anderson (1997) [9] reported that increased odds ratio of back pain in drivers who drive more than 20 hours per week regularly. In Kolkata bus driver's work for about 8-10hrs' shifts per day for 6 days in a week and 1 day off, which work out to about 60 hours

per week. Indeed this is an alarming condition when we compare these long working hours with the recommended working hours as derived from overseas studies (20 hours per week) and certainly put them in a "Very high-risk" group.

From the Oswestry low back pain disability questionnaire it was found that the driver's are suffering from low back pain (LBP) to a great extent. The LBP have taken huge toll not only on their ability to work but also in their social and regular domestic activities. In some cases acute LBP have increased their discomfort while driving. But most importantly hindrance is being caused in personal life. Many of them find it extremely difficult to wash their own clothes at home, lift water buckets, bath properly and carry on some task involving constrained postures. Thus they are unable to take care of their personal needs. Most often they avoid social gatherings and other outdoor recreational activities like watching movies with their families, as this would mean traveling from home to some other places, which again amounts to a lot of discomfort. From the questionnaire (Fig. 1 and 2) it was found that maximum number of subjects suffering from moderate followed by minimal and severe disability.

From the results, it can be concluded that the bus drivers are highly stressed in their occupation due to the hazardous working conditions, which in turn may additionally affects their health and overall work performance in the long run. Most of the drivers who were suffering from LBP, their social and professional lives were highly affected.

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