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Occupational Health exposure risk factors related to Lower back pain amongst Drivers/Operators of articulated vehicles and non-Drivers of articulated vehicles at the Ngqura Container Terminal, in the Eastern Cape.

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ABSTRACT

Lower back pain remains one of the most common work-related complaints of the developed and developing countries. The objective of this study was to examine the prevalence of occupational health exposure risk factors associated with lower back pain in drivers/operators of articulated vehicles and non-drivers of articulated vehicles at the Ngqura Container Terminal, in the Eastern Cape. The study used a structured questionnaire and interview method to obtain primary data analysis. The crude odds ratios were calculated using SPSS program. The multivariate logistic regression was used to get the adjusted odds ratios to obtain occupational risk factors associated with lower back pain. Frequencies and percentages were identified using the descriptive statistical analysis. The majority of the 579 participants (60.4%) were Drivers of articulated vehicles, mostly Black African men. They had higher odds of being overweight or obese and working longer at the terminal than non-Drivers. No seat-related factors were significantly linked to lower back pain among Drivers. Several activities showed significant differences in difficulty between Drivers and non-Drivers. In this study race, gender, years of driving vehicles or operating the machines, income and obesity certainly played a large role in lower back pain. The risk factors for lower back pain are the males of coloured and the back race, working at Ngqura Container terminal for a period of 5 years to more than 10 years, earning between R15 000 to R30 000 and obese.

Keywords: Lower Back Pain, Body Mass Index, Prolonged Driving, Driver's Seat Condition, DAVs, non-DAVs.

1. Introduction

Lower back pain (LBP) is a common symptom that affects the muscles, nerves, or bones of the lower spine[1]. It can be acute or chronic, depending on the duration and cause. LBP can have various causes, such as injury, strain, arthritis, disk problems, or kidney issues. LBP is very prevalent, affecting up to 84% of adults at some point in their lives. It can also lead to disability and economic burden[2,3]. Chronic LBP (CLBP) is a condition that lasts for more than 12 weeks and has a specific underlying cause. CLBP is not just a symptom, but a disease that needs proper diagnosis and treatment[3,4,5].

Truck driving is a common cause of low back pain (LBP), which affects 45% to 81% of drivers and leads to high costs and absenteeism [6]. Several factors can contribute to LBP, such as long work hours, sitting posture, physical load, vibration, ergonomic design, diet, job satisfaction, and personal characteristics [7-16]. The most harmful factor is prolonged exposure to whole body vibration, which can damage the spine and other organs [17]. Poorly adjustable seats can also cause poor posture and LBP [18].

This study aimed to examine the occupational risk factors of LBP among drivers of articulated vehicles (DAVs) and non-DAVs at the Ngqura Container Terminal (NCT) in the Eastern Cape, where no previous research has been done. The results can help raise awareness, education, and prevention of LBP among employees and management at NCT.

2. Ethics Statement

This study followed ethical principles for human research, such as obtaining approval from the University of Johannesburg's research ethics committee (REC-268-2020), ensuring voluntary and informed consent from participants, protecting their anonymity and confidentiality, and avoiding harm or discomfort. The data collection methods were standardised and reliable, using random and snowball sampling to select DAVs and non-DAVs from the port database. However, the sample may not reflect the port's demographic diversity. The study also respected the rights of the community and the scientific community.

3. Method

The study collected data from 579 participants, divided into DAVs (drivers and equipment operators) and non-DAVs (administrators and port workers). The data was analysed using SPSS and logistic regression to find associations between lower back pain and various risk factors. The results were presented in AOR and 95%CI. The multivariate logistic regression was used to get the adjusted odds ratios to obtain occupational risk factors associated with lower back pain. Confidence intervals were used to obtain the statistical significance in the within the variables. The data was then presented using figures and tables.

4. Results

4.1 DAVs and non-DAVs Socio-Demographic Characteristics Distribution

The information collected from the participants on socio-demographic characteristics was stratified by whether the participants were DAVs or non-DAVs. The characteristics were categorized into age groups, race, gender, education, years working at NCT and BMI category. Overall, 350 (60.4%) out of 579 participants belonged to the DAVs category. Among these most (81.43%) of the DAVs were Black African, mostly male (89.43%) with the highest education level being matric at 86.29%. On average these individuals in the DAVs category have been working at NCT for majority 5 – 9 years (61.43%) while majority (52.9%) receive an income of R22 501 – R30 000 closely followed by the 46.9% who earned in the R15 001 – R22 500 category. It can be stated that majority of DAVs were overweight to obese as these categories combined make up 82.84% of the BMI category.

The logistic regression was used to calculate crude ratios and adjusted odds ratios including their confidence intervals for DAVs and non-DAVs by socio-demographic characteristics such as age groups, race, gender, education level, years of working at NCT, income and BMI category. The participants of the Coloured and Black race were significantly more likely to be DAVs as both their adjusted odds ratio (AOR) are significantly greater than 1 with AOR of 12.66, 95% CI (3.35 – 47.82) and 4.96, 95% CI (1.40 – 17.57) respectively. Male participants were significantly more likely to be DAVs supported by both the OR 3.40, 95% CI (2.24 – 5.45) and AOR 1.98, 95% CI (1.15 – 4.83). On the education level, participants with a matric were not significantly more likely to be DAVs with OR 1.55, 95% CI (0.98 – 2.55) but the AOR 1.36, 95% CI (2.77 – 6.69) was significant.

4.2 Occupational Risk Factors

BMI measured using weight and the height, duration of driving or working and seat condition, these were work related risk factors used in the examination of this study in association with lower back pain. Of the 579 participants, 350 being DAVs and 229 non-DAVs. The mean weight for DAVs was 90.41, standard deviation (SD) 16.89 and for non-DAVs was 79.33, standard deviation (SD) 16.23 respectively. The weight distribution graph is shown in Figure 1.

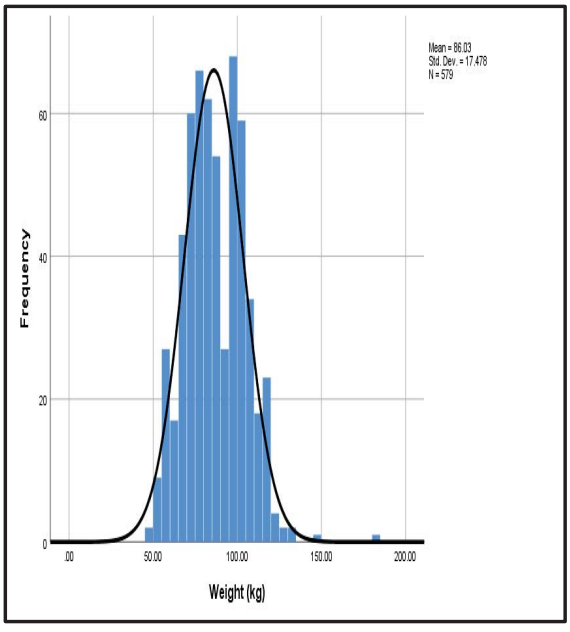

Figure 1: Distribution of Participant Weight

The weight distribution of the participants was almost normally distributed with a peak at 86 kg. The mean weight was 84.87 (SD 16.56) all ranging from 49 kg to 105 kg. Of the 579 participants, 350 being DAVs and 229 non-DAVs, the mean height and standard deviation (SD) for DAVs was 169.84 and 7.90 for non-DAVs mean was 167.45 and standard deviation (SD) 8.57 respectively. The height distribution of the participants was almost normally distributed with a peak at 168 cm. The mean height was 168.65 cm (SD 8.24) all ranging from 145 cm to 192 cm. The distribution of the participants' BMI was almost normally distributed with a peak at 30. The mean BMI was 29.91 (SD 5.95) all ranging from 16.80 to 49.80. BMI category distribution for DAVs and non-DAVs. BMI was categorized into four groups: under/healthy, overweight, obese class I and obese class II & III. DAVs mean was 31.50 and standard deviation (SD) was 6.41 and for non-DAVs mean was 28,32 and standard deviation was (SD) was 5.48. Majority of the participants are overweight as indicated in the responses with 178 (30.74%) while the fewest category with 123 (21.24%) are underweight or healthy. The obese class II & III received 25.91% (150) of the participants while obese class I received 22.12% (128).

When grading seat scores of the DAVs, the majority of DAV participants (183 out of 350) belonged to the vehicle category. When asked if they had received instructions on how to adjust their seat in the last 12 months, the majority (140 out of 183) of vehicle drivers disagreed. 129 out of 183 vehicle drivers agreed that they sit on an adjustable seat while 151 out of 183 agreed that their seat had mechanical suspension. Finally, in the seat related items, 88 out of 183 vehicle drivers disagreed that their seat had a good backrest while 79 out of 183 agreed that their seats have a good backrest. None of the items were found to be significantly more likely to cause lower back pain to DAVs at 95% CI.

A total of 25 questions were asked to assess if the participants were capable of carrying out certain activities. Some question asked on who received instructions on how to adjust seat in the last 12 months, ORs

strongly disagree 0.04, 95% CI (0.01 - 0.80), disagree 4.98, 95% CI (0.30- 80.85), neutral 0.05, 95% CI (0.01 - 1.08), strongly agree 0.28, 95 % CI (0.03 – 2.47). Sit on adjustable seat, ORs strongly disagree 0.01, 95% CI (0.01 - 0.23), disagree 0.25, 95% CI (0.02 - 4.08), neutral 0.01, 95% CI (0.01 - 0.17), strongly agree 0.38, 95% CI (0.12 – 1.23). Seat has mechanical suspension, ORs strongly disagree 0.01, 95% CI (0.00 - 0.20), disagree 0.13, 95% CI (0.01 - 2.09), neutral 0.01, 95% CI (0.00 - 0.15), strongly agree 0.25, 95% CI (0.03 –2 .23). Seat has a good backrest, ORs strongly disagree 0 .02 , 95 % CI (0 .00 - 0 .41), disagree 1 .24 , 95 % CI (0 .08 - 20 .10), neutral 0 .07 , 95 % CI (0 .01 - 1 .18), strongly agree 0 .39 , 95 % CI (0 .08 –2 .01). Questions were asked to assess if the participants were capable of carrying out certain activities based on the items scale LBP reliability validated questionnaire to ensure that answers can be replicated (Quebec back pain disability index scale).

Participants who sat on a chair for several hours were significantly more likely to have difficulty with the activity. Participants who pulled or pushed heavy doors were also significantly more likely to have difficulty with the activity. The participants who were able to get out of bed were less likely to have problems with the activity. The participants who ran one block (100 m), climbed one flight of stairs, walked several miles, and rode in a car were significantly more likely to have difficulty with the activity. Participants who walked a few blocks (300 – 400 m) were significantly less likely.

Participants who made beds and put on socks/pantyhose were significantly more likely to have difficulty with the activity. The participants who slept through the night were significantly more likely to have minimal difficulty with the activity. The participants who turned over in bed were significantly more likely to have some difficulty with the activity. The participants reached up to high shelves were significantly more likely to have minimal difficulty with the activity. The participants who stood up for 20 – 30 minutes were significantly more likely to have some difficulty with the activity. The participants who threw a ball were significantly more likely to have minimal difficulty with the activity.

5. Discussion

The purpose of this study was to examine risk factors that are associated with Lower Back Pain (LBP) in drivers/operators of articulated vehicles at the Port of Ngqura in the Eastern Cape. In addition, the study also compared the examined risk factors associated with LBP in non-DAVs. From this study, the risk factors for LBP are being male (AOR;95%CI) coloured or black African race (AOR;95%CI) having been working at NCT for 5-9 years or 10+ (AOR;95%CI), earning an income of R15 - 30K, (AOR;95%CI) being DAV. (AOR;95%CI). The study did not find any statistical significance for the rest of the factors although some associations were established. One study found that low back pain of vehicle drivers is mainly caused by long hours of driving in a restricted posture, car vibration or shocks from roads, and mental stress associated with driving[2],[12]. Another study found that operators exposed to driving heavy equipment vehicles are at more than twice the risk of developing lower back pain in comparison to those not exposed to driving heavy equipment vehicles [5,10,14].

The p-value in the study, for age, weight, BMI and years working at NCT were <0.0005, while the p-value for height was <0.001. These p-values were significant because they were less than 0.05. Meaning that the null hypothesis for BMI should be rejected, that there is no association between BMI and LBP in DAVs and non-DAVs at the Ngqura Container Terminal in South Africa. Except that there is an association between BMI and LBP in DAVs and non-DAVs at Ngqura Container

Terminal in South Africa. On the seat related items, none of the items were found to be significantly more likely to cause lower back pain to DAV. However, findings from a study conducted on 1,000 drivers in Iran found that there was a significant association between BMI and low back pain[11]. Another study conducted on 1,000 taxi drivers in India found that there was a significant association between BMI and low back pain [8].

6. Conclusion

The study found that participants of the Coloured and Black race were significantly more likely to be DAVs. Male participants were significantly more likely to be DAVs. Participants who sat on the chair for several hours were significantly more likely to have difficulty with the activity of sitting on the chair. Participants who pulled or pushed heavy door were significantly more likely to have difficulty with the activity of pulling or pushing the heavy door. The participants who ran one block (100 m) were significantly more likely to have problems with the activity of running one block. The participants who climbed one flight of stairs were significantly more likely to have difficulty with the activity of climbing one flight of stairs. The participants who walked several miles were significantly more likely to have difficulty with the activity of walking several miles. The participants who rode in a car were significantly more likely to have difficulty with the activity of riding a car. Participants who made a bed and put on socks/pantyhose were significantly more likely to have difficulty with these activities.

Abbreviations

DAV: Drivers of the Articulated; Non – DAV: Non - Drivers of the Articulated; LBP: Lower Back Pain; OHSA: Occupational Health and Safety Act; OMP: Occupational Medical Practitioner; NCT: Ngqura Container Terminal; PH: Public Health; PoN: Port of Ngqura; WBV: Whole Body Vibration

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