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Prevalence of Musculoskeletal Risk Factors among Truck Drivers at the Jordan Petroleum Refinery Company

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ABSTRACT

An observational cross-sectional study was conducted on 283 truck drivers and 100 work site controls at the Jordan Petroleum Refinery Company (JPRC). All participants were males with experience ranged from 5 to 35 years. Clinical evaluation consisted of an assessment of social habits and demographic data and risk factors for musculoskeletal disorders MSDs. Relatedness of MSDs with risk factors between the two groups was checked by univariate and multivariate analyses. 42% of the occupational drivers reported back pain and only 7.2% reported legs pain. These prevalence rates were significantly higher than those found among clerical workers (37.7% and 3.8%, respectively). Elevated incidences of pain in lumbar vertebrae, shoulder, and knee were recorded. Musculoskeletal pain significantly increased with age, weight, sitting posture and overwork. Surveyed truckers were found to have significant issues affecting their health; hemorrhoidectomy (9.84%), thyroidectomy (7.56%), disc surgery (4.37%), and varicosity (3.28%). These findings may help researchers to develop interventions to improve emotional and occupational health of health of truck drivers. It is recommended to improve the truck drivers working conditions to avoid or reduce their problems.

KEYWORDS: ***Health risk factors; Jordan Petroleum Refinery Company; Low back pain; Musculoskeletal disorders; Occupational truck drivers.***

I. INTRODUTION

Truck drivers represent a highly underserved large and diverse population; long working hours, excessive noise and vibration, prolonged sitting and unhealthy lifestyles, thus truck transportation is one of the highest occupational injuries and illness rates, resulting in a tremendous burden of workers' compensation costs to employers [1]. Literature indicates three salient categories of morbidity prominent in populations of truck drivers; cardiovascular disease, gastrointestinal disorders, and musculoskeletal problems [2- 6]. Work-related musculoskeletal disorders (MSDs) are inflammatory and degenerative disorders of muscle, tendons, ligaments, joints, peripheral nerves and supporting blood vessels caused or aggravated by work [7]. These diseases, especially low back pain (LBP), are a major cause of absenteeism, diminished work capabilities and early retirement of industrial workers and public vehicle drivers with substantial economic losses to individuals as well as to the community [3].

Of the common health and wellness related to in commercial driving are smoking, obesity/ hypertension, lack of physical activity, fatigue, alcohol and drug use. Obesity, in particular, is linked to high health care costs [2, 6, 8, 9]. However, whether other factors (i.e., lack of exercise, poor diet, fatigue, sleep apnea) could

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

contribute to the elevated health expenditures and crash risk is unclear. Absenteeism and job change is related to crash risk [10] although it is not clear what led to absenteeism or job change, and whether other factors may have influenced crash risk. MSDs, stress, diabetes, hearing and vision impairments and sleep disorders, can all impair driving safety. Truck drivers are subjected to various chemical hazards such as skin reactions and chemical burns, headaches, nausea, dizziness (especially in gasoline tanker trucks), and lung cancer from inhaling diesel exhaust [11].

Due to the importance of truck driving, regulatory agencies and safety professionals are very concerned about health hazards involved in the profession, both in terms of the direct threat these hazards present to drivers and the [1, 6, 12] danger pose to the public.

The nature of this occupation not only places them at high risk for unhealthy lifestyles and related health problems, but also makes them a difficult population to study. Consequently, truckers remain both a highly vulnerable and a seriously underserved working population [13]. Most of the factors mentioned above have not been fully evaluated and are not usually considered to be within the scope of health or labor services. To date, there is no empirical research on MSDs among occupational drivers in Jordan. The present study, focuses on investigation of personal and occupational determinants of MSDs among a sample of truck drivers in the Jordan Petroleum Refinery Company (JPRC). The results from the survey may provide baseline health and injury data that can serve identification where intervention is needed and to guide the development of health and safety policy for long-haul truck drivers.

II. METHODOLOGY

In this cross-sectional study, 283 male tank truckers at JPRC located about 15 miles east of the capital; Amman are randomly recruited. The age was between 28 and 61years (body weight 54-105Kg). The duration of experience range from 5 to 35 years. The subjects usually transport cargo over long distances. The control subjects are 100 none work office employees of corresponding age and weight. Workers with either acute or chronic active disease, has undergone some form of medical surgery in the last 12 months, take medication on a daily basis, has no formal contract with the company are excluded from the study. Drivers with a history of traumatic road or work accidents are also excluded from the study. Since females are not recruited for this job, they are excluded from the study.

Ethical approval is obtained and an Informed Consent Statement produced and shared with participating organizations and drivers. Participants' identities are kept anonymous by using codes. They are allowed to withdraw themselves at any stage of the study. The standardized Nordic Questionnaires is used for the analysis of the musculoskeletal symptoms. The questionnaires are filled by face-to-face interview with subjects by the same investigator. Each interviewee is asked about his lifestyle, and medical history. This include age, weight, sitting posture (anterior, middle, or posterior), overwork, years of driving and rest or vacations for medical reasons. The health problems of the participant such as musculoskeletal pains, surgeries, medications, and hospitalization are recorded. The questionnaires validated and. confirmed by comparison with subjects occupational and medical records. The prevalence of musculoskeletal problems of each body segment are documented and represented by bar diagrams (Figures 1 through 3).

Data analysis

Double data entry is performed to reduce data entry errors. SPSS version 14, Chicago IL, USA) is used for data analyses. To profile respondents and to determine the most prominent risk factors, univariate analysis is conducted to generate

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

descriptive statistics. All continuous variables are categorized (Tables 1) to ease analysis. The associations are described by the prevalence with 95% confidence interval. In multivariant analysis, ANOVA test is used to examine the existence of associations between pain outcomes in various boy parts and various categorical variables.

Differences between groups were examined by $\chi 2$ test (for categorical variables). Duncan multiple comparison (Table 2) was aping the following formulae:

$Rp = r0.05 (p, f) S\bar{y}$, where, p=2, 3, 4…a

$S\bar{y}=\sqrt{MSE/n}$

Furthermore, the Tukey's has type I error rate of significance level (α) for all pairwise comparison on experimental basis.

III. RESULTS

Figure (1) showed that 72% of the surveyed truckers and 34% of the control respondents reported some disturbances in the musculoskeletal system pain during the previous 12 months and 60% reported LBP. Truckers had higher significant rates of pain in the back (42%) and the legs (7.2%), as compared to 37.7% and 3.8% of the control in the corresponding regions, respectively. Similarly, 5.77% of the drivers and 1.4% of the control subjects experienced pelvic pain. Furthermore, the pain in the lumbar vertebral region among drivers was more frequent than among the control sample (41.5% versus 5.8%, respectively). The intensity of pain varied between weak (27.6%), intermediate (41.4%) and strong (31.0%). The frequency of pain was in the following increasing order: 21.6 % continuous, 25.2% daily, 26.1% weekly and 27.1% monthly.

Medical history (Figure 2) showed significant issues affecting the drivers' general health hemorrhoidectomy (9.84%), thyroidectomy (7.56%), disc surgery (4.37%), and varicosity (2.28%). As shown in figure (3), the specific habits of sitting posture during driving was 10.6% anterior (forward leaning), 68% middle (erect), and 18% posterior (backward leaning). Only 3.4% used lumbar support.

Table (1) indicated weak association (Pearson correlation; 0.24-046) between age, weight, absenteeism, experience, overtime work and sitting posture relative to different types of pain in the drivers' body regions. The results show a significant difference between experimental and control groups.

Table (2) reveals that some sources of pain in various body parts were related to occupation, while others were not. The arms, shoulders, cervical ad lumbar vertebrae, back, leg and knee were most frequently ($p \leq 0.05$) associated with age, weight, absenteeism, experience and overtime. In contrast, sitting posture was not significantly correlated ($P \geq 0.05$) with feeling pain in all studied body parts.

IV. DISCUSSION

A key finding in the present study was that truck drivers have significantly higher (42% versus 37.7%) chance to have multiple factors that put them at high risk for MSDs events. The prevalence rates for the major body areas; back, lumbar spines, legs, knee, and shoulders were: 42%, 41%, 38%, 34%, and 32%, respectively. Studies on this topic are limited in Jordan and around the world despite the relevance of these workers to productivity and national economy. It is often difficult to compare findings across different studies concerning the role that occupational factors play in developing MSDs [4]. Our results are in agreement with prevalence of musculoskeletal troubles among car [14] drivers. A 60% prevalence of LBP among professional truck drivers over 12 months has been reported for business and professional truck drivers in England [15]. Our results are lower compared to 60.4% prevalence of LBP among Malaysian commercial vehicle drivers [16]. High prevalence rate (89.3%) of MSDs was found among Nigerian occupational

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

drivers [17, 18]. Furthermore, discomfort leading to MSDs mainly affecting the leg (93.3%), knee (83.3%), shoulder (80%) and back areas (56.7%) was reported in bus conductors in India [17]. The rates of LBP were 64.5%, and 54% in Nigeria [19] and India [18], respectively.
Lower incidences (31.6%) of truck drivers' musculoskeletal injuries were given by other researchers [5].

In China [20], prevalence rates in the same body regions were 24.0%, 28.0%, 15.5% and 18.6%, respectively. More upright and less constrained posture may reduce prevalence of LBP.

In our investigation, most drivers (68%) used this sitting posture; only 40% of the drivers often had back trouble. High prevalence of work-related musculoskeletal injuries in drivers, particularly LBP is possibly due to repetitive movements, forceful exertions, prolonged sitting position, [11, 7, 4] whole-body vibration and absence of enough exercise.

Individual factors such as age, gender, weight, height, body mass index, and general health status are also associated with the work-related ailments of drivers [17, 20]. This is consistent with our findings regarding significant increase in MSDs with increases in these factors. In our study, longer years of driving experience increased prevalence of musculoskeletal pain. Similarly, the years of driving experience significantly influenced experience of low back [11]. This result is contrary to other studies [21] where association between prevalence of musculoskeletal pain among drivers and different durations of driving was statistically not significant.
One limitation of our study is the fact that it was cross- sectional, and it examined a sample of 283 truck drivers. This makes it difficult to determine causality, and it is not known whether this actually represents the true characteristics of the larger population of truck. It is possible that such a study may have attracted more of those who have problems rather than those who do not. Studies are limited by their cross sectional design and reliance on self-report measures [3] which is subject to recall and social desirability bias. Additionally, it is possible that mixed findings are due to differences in geography, sample size and composition (sex, age, race, etc.). Only one study [6] recruited a larger percentage of African Americans (17%) and Hispanics (9%) which may reflect an American demographic as African Americans and Hispanics represent 25% of all commercial drivers.

In conclusion, our findings are preliminary and more comprehensive analyses of whole-body vibration, and psychosocial factors are needed. Collaboration between health policy makers and road transport authority is highly important in order to formulate prevention strategies and initiate proper medical intervention at the right time when early symptoms of MSDs manifested.

TABLE 1. Association between Several Physical and Occupational Variables and Pain in Body Regions among Truck Drivers at The Jordan .Petroleum Refinery Company

Variable	Body Region	(P-values) χ^2-test	Pearson Correlation
Age	Arm	0.0015*	0.36
Weight	Cervical Vertebrae	0.040	0.26
	Pelvis	0.015	0.29
Absenteeism	Cervical Vertebrae	0.002*	0.41
	Thoracic Vertebrae	0.003*	0.34

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

Experience at the Refinery	Arm	0.002*	0.35
	Shoulder	0.0001*	0.46
	Cervical Vertebrae	0.001*	0.36
Previous Experience	Arm	0.046	0.26
	Elbow	0.009	0.32
Overtime	Cervical Vertebrae	0.04	0.31
Sitting Posture	Shoulder	0.012	0.30
	Back	0.006	0.32
	Cervical Vertebrae	0.002*	0.40
	Knee	0.013	0.30
	Feet	0.019	0.29

- All $\chi 2$- test ($P \leq 0.05$) are significant.
* χ- test ($P \leq 0.005$) are highly significant

TABLE 2. Duncan Multiple Comparison between Some Sources of Pain in Various Body Regions among Truck Drivers at JPRC

Factor	Body Region	Arm	Elbow	Shoulder	Back	Cervical Vertebrae	Thoracic Vertebrae	Lumba Vertebrae	Pelvis	Knee	Feet
Age	Back	-	*	*	-	*	-	-	*	-	*
	Lumbar Vertebrae	-	-	-	-	*	-	-	*	-	-
Weight	Back	-	*	-	-	*	-	-	*	-	-
Absenteeism	Back	-	*	-	-	*	-	-	*	-	-
Experience at the Refinery	Back	-	*	-	-	*	*	-	*	-	*
	Lumbar Vertebrae	-	*	-	-	*	-	-	*	-	-
	Legs	-	-	-	-	*	-	-	*	-	-
Previous Experience	Arm	-	-	-	-	*	-	-	*	-	-
	Shoulder	-	*	-	-	*	-	-	*	-	-
	Cervical Vertebrae	-	*	-	-	-	*	-	*	-	*
	Lumbar Vertebrae	-	*	-	-	*	*	-	*	-	*
	Back	*	*	*	-	*	*	-	*	*	*
	Legs	-	*	-	-	*	*	-	*	-	*
Overtime	Back	-	*	-	-	*	*	-	*	-	-
	Lumbar Vertebrae	-	-	-	-	*	-	-	*	-	-

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

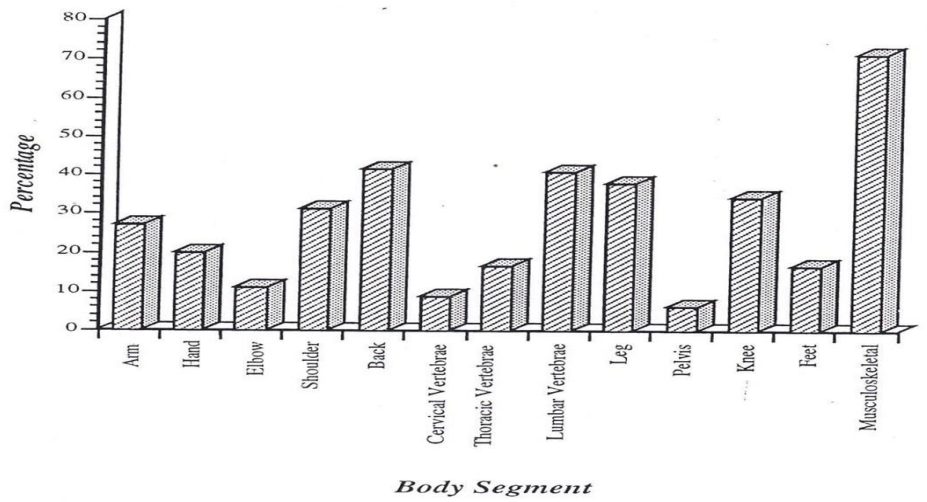

Figure 1. Distribution of Pain in Various Body Segments among Truck Drivers at JPRC.

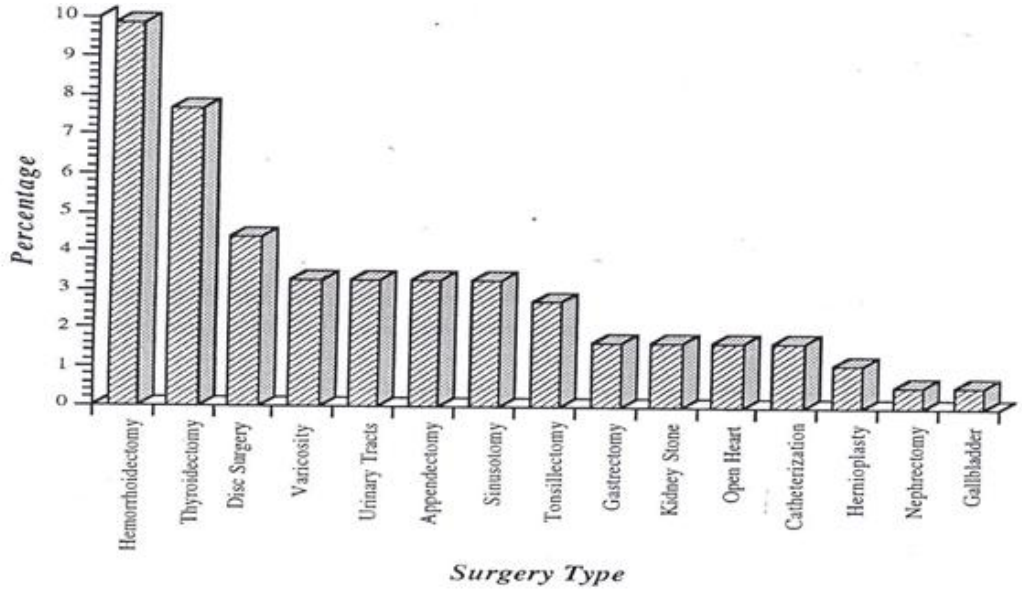

Figure 2. Distribution of Different Types of Surgeries among Truck Drivers at JRPC.

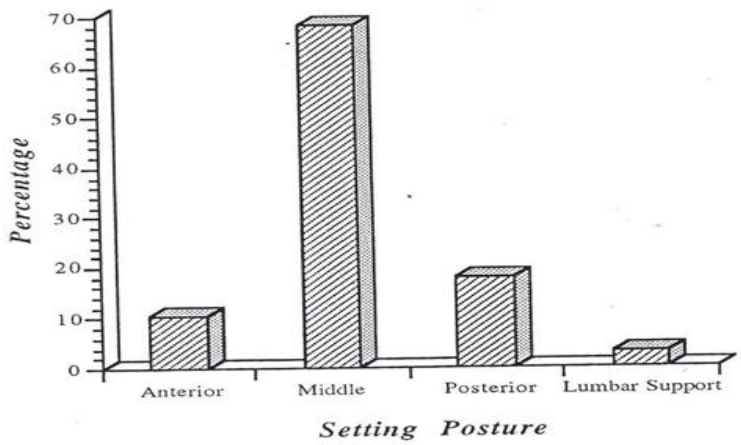

Figure 3. Frequency of Sitting Postures among Truck Drivers at JRPC.

Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317

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Volume 2 Issue 12 December 2017
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Page : 310-317

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Volume 2 Issue 12 December 2017
DOI: 10.18535/etj/v2i12.01
Page : 310-317