



## Musculoskeletal Disorders and Ergonomic Risk Factors in Drivers of A Transport Company in Colombia

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### Abstract

The objective of this research is to determine the presence of musculoskeletal disorders and ergonomic risk factors in drivers of a transport company in Colombia. The developed methodology was framed within a quantitative approach, with non-experimental design and cross-section; for the realization, there was a sample of 146 participants.

The Nordic Test was used to collect the information, to identify the main musculoskeletal disorders of the population evaluated. Likewise, the ERGOPAR V2.0 Ergonomic Risk Factor and Damage Questionnaire was applied, through which the researchers recognize signs and symptoms associated with musculoskeletal disorders, and in this way determine their origin and allow formulating a plan of intervention that allows the improvement of working health conditions and reduction of work absenteeism and Long-term Occupational Diseases. Among the results and conclusions, it was found that the main musculoskeletal disorders presented by the population under study are unspecified and postural low back pain, painful shoulder, rotator cuff syndrome, carpal tunnel syndrome and cervicgia. Similarly, the ergonomic risk factors found were forced and static postures of up to 8 hours a day, exposure to vibrations at the time of passenger transport, exposure to environmental and passenger noise, manual handling of loads, fatigue physical and mental.

**Keywords:** Ergonomics; Driver; Working Conditions; Workstation

### Introduction

Musculoskeletal disorders are considered as a group of conditions that affect different parts of the body, regardless of the type of work performed by the employee, and which are currently very

prevalent due to the automation of activities and the few breaks that occur in the working hours [1].

The areas most affected by these disorders attack the dorsal and lumbar spine, which are mainly associated with lifting and han-

dling loads. Likewise, areas of the upper limbs such as face, neck, shoulder, arm, forearm, wrist and fingers, can be affected by the execution of repetitive movements or the application of static forces. These disorders can be transitory, but if it is preventive and/or corrective measures are not taken, they can become occupational diseases, which generally produces limitation in the execution of various movements, due to the presence of symptoms such as pain and inflammation, which are the result of the overload of the injured area and underlying structures [2].

Due to the symptomatology and the limitations generated by musculoskeletal disorders, they are considered as one of the main causes of work absenteeism, which generate great costs both for the company and for the health system [3,4].

However, much of the musculoskeletal disorders that are related to work, develop over time and the cause is not unique, but associated with various risk factors within which is the handling of loads, especially in movements such as knee and hip flexion and extension, trunk rotation, repetitive or forced movements, postures maintained over time, vibrations, poor lighting or cold work environments, working at a high rate, being in a bipedal or sitting position for a long time [5], routine and mental effort, organizational and psychosocial factors associated with work, unhealthy lifestyle habits such as smoking, sedentary lifestyle, among others [6-8].

In the case of drivers, their workdays, imply the adoption of postures maintained for a long time, which lead to an increase in muscular stress and pain in the lower back, due to the short periods of rest, traffic congestion, among others [9].

Therefore, the purpose of this work was to determine the presence of skeletal muscle disorders and ergonomic risk factors in drivers of a transport company in Colombia.

## Materials and Methods

### Participants

The present study is quantitative, with non-experimental design and cross-section; For its realization, there was a population of 207 drivers linked to the transport company Flota Huila S.A, from the city of Neiva in Colombia. The sample was obtained from the formula for finite populations with a confidence level of 99%, a

margin of error of 5% and a probability of occurrence of 0.25, for a total of 146 participants.

### Instruments

#### Ergonomic risk factors

In order to find this variable, the Ergonomic Risk Factor and Damage Questionnaire - Manual of the ERGOPAR V2.0 Method was used, which aims to identify ergonomic risk factors and damages present in the jobs selected for analysis. The questionnaire is anonymous and voluntary, and the treatment of the data carried out by the members of the Ergo Group will be confidential and has the informed consent, which each worker knows and has signed in advance of the application of the questionnaires.

#### Musculoskeletal disorders

For this variable, the Nordic test was used, which is a standardized questionnaire for the detection and analysis of musculoskeletal symptoms, applicable in ergonomic studies of occupational health to detect the existence of initial symptoms that have not yet been constituted in illness or have not yet taken to the doctor.

The analysis of the information was carried out through the statistical program SPSS version 23, where measures of central tendency, means, maximum and minimum values, standard deviation were calculated.

## Results and Discussion

The workers surveyed are all male and are mostly between 36 and 40 years old. The age of the respondents is relevant to the research work, to determine if there is any relationship between signs and symptoms associated with MSDs (Musculoskeletal disorders) and age, Given that, as the years progress, the bone tissue loses calcium and muscle tissues become thin due to the characteristic atrophy of that tissue after age 35, which can affect the appearance of MSDs with a cause other than labor.

Table 1 shows that about 84% of the participants in the study work more than 4 hours per day, with schedules divided between morning and afternoon (52%), who mostly (84%), report that the modality Hiring is "indefinite" and 64% have been working as a driver for more than 5 years. The data of the time that a person takes as a driver is relevant to determine the subclinical and clinical stage of the possible MSDs that afflict this population.

Variable		Number	%
Work hours	Up to 4 hours / day	23	16
	More than 4 hours / day	123	84
Type of schedules	Irregular	3	2
	Match: morning / afternoon	77	52
	Fixed shift tomorrow	2	1.3
	Fixed shift late	7	8
	Fixed night shift	1	0.7
Type of agreement	Eventual	23	16
	Undefined	123	84
Years of antiquity	Under 1 year	3	2
	1 to 5 years	50	34
	More than 5 years	93	64

**Table 1:** Labor variables.

About, the Nordic test, it is evident that the major discomforts are located in the neck, shoulder and dorsal-lumbar area, which have been persistent in the last 12 months, but which have mostly not needed to change jobs (Table 2).

These discomforts have an average progression time of 1 to 2 years in the neck and the dorsal-lumbar region, which have had an appearance frequency of less than 30 days, with episodes that last on average from 1 to 24 hours, but which they do not prevent the development of their work activities (Table 3).

Concerning table 4, it is evident that the areas where workers are most bothered are the neck, lower back, and feet, which sometimes occurs, but that does not permit them to do their job. Similarly, employees agree that these inconveniences occur as a result of the work of the position they perform (Table 5).

Variables	Neck		Shoulder		Dorsal / Lumbar		Elbow/ Forearm		Wrist	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
He has had discomfort in ...	83 (56,5%)	64 (43,5%)	31 (21,1%)	116 (79,9%)	107 (72,8%)	40 (27,2%)	25 (17%)	122 (83%)	48 (32,6%)	99 (67,3%)
Have you needed to change jobs?	4 (2,7%)	143 (97,3%)	1 (0,7%)	146 (99,3%)	14 (9,5%)	133 (90,5%)	0 (0%)	147 (100%)	0 (0%)	147 (100%)
He had discomfort in the last 12 months	83 (56,5%)	64 (43,5%)	28 (19,1%)	119 (80,9%)	104 (70,8%)	43 (29,2%)	24 (16,3%)	123 (83,7%)	43 (29,3%)	104 (70,7%)

**Table 2:** Description of skeletal muscle disorders.

Source: Self-made.

Variables		Less than 1 year	1 to 2 years	3 to 4 years	More than 4 years
How long have you suffered the discomfort?	Neck	17	41	12	13
	Shoulder	5	11	8	7
	Dorsal-Lumbar	17	46	31	13
	Elbownn- forearm	9	13	1	2
	wrist	18	14	9	7
Variables		> 30 days, not followed	1--7 days	8--30 days	Does not refer
How long have you had discomfort in the last 12 months?	Neck	86	39	22	0
	Shoulder	4	27	9	107
	Dorsal-Lumbar	65	18	23	41
	Elbownn- forearm	3	22	8	114
	wrist	18	10	19	100
Variables		<1 hour	1 to 24 hours	1 to 7 days	Does not refer

How long is each episode?	Neck	22	70	3	52
	Shoulder	20	21	21	99
	Dorsal-Lumbar	11	59	33	44
	Elbownn- forearm	19	9	3	116
	wrist	15	29	5	98
Variables		0 days	1 to 4 week	1 to 7 week	No refiere
How long have these dis-comforts prevented you from doing your job in the last 12 months?	Neck	91	0	7	49
	Shoulder	42	0	6	99
	Dorsal-Lumbar	76	5	31	35
	Elbownn- forearm	37	2	7	101
	wrist	46	1	13	87

**Table 3:** Description of Nordic test A.

Variables		Neck, shoulder y/o dorsal Spine	Lumbar spine	Elbown	Hands	Legs	Knees	Feets
Have discomfort or pain in this area?  (n:147)	Does not refer	15 (10,2%)	27 (18,4%)	109 (74,1%)	109 (74,1%)	104 (70,7%)	80 (54,4%)	20 (34,0%)
	Have pain	27 (18,4%)	45 (30,6%)	1 (0,7%)	11 (7,5%)	3 (2,1%)	15 (10,2%)	18 (12,2%)
	Has discomfort	105 (71,4%)	75 (51,0%)	37 (25,2%)	27 (18,4%)	40 (27,2%)	52 (35,4%)	79 (53,7%)
How often?  (n:147)	Sometimes.	102 (69,4%)	89 (60,5%)	37 (25,2)	29 (19,7)	38 (25,9%)	46 (31,3%)	75 (51,0%)
	Many times.	30 (20,4%)	30 (20,4%)	1 (0,7%)	8 (5,4)	5 (3,4%)	21 (14,3%)	21 (14,3%)
	Does not refer	15 (10,2%)	28 (18,8%)	109 (74,2%)	110 (74,8%)	104 (70,7%)	80 (54,4%)	51 (34,7%)
Has it ever prevented you from doing your current job?  (n:147)	No	128 (87,1%)	132 (89,8%)	146 (99,3%)	144 (98%)	142 (96,6%)	139 (94,6%)	143 (97,3%)
	Yes	19 (12,9%)	15 (10,2)	1 (0,7%)	3 (2%)	5 (3,4%)	8 (5,4%)	4 (2,7%)
It is a consequence of the work of the position you perform  (n:147)	No	51 (34,7%)	52 (35,4%)	122 (83%)	116 (78,9%)	123 (83,7%)	104 (70,7%)	74 (50,3%)
	Yes	96 (65,3%)	95 (64,6%)	25 (17%)	31 (21,1%)	24 (16,3%)	43 (29,3%)	73 (49,7%)

**Table 4:** Distribution of ergonomic risk factors variables.**Source:** self-made.

Variables	Never / Less than 30 minutes	Between 30 minutes and 2 hours	Between 2 y 4 hours	More than 4 hours
Sitting (chair, stool, vehicle, lumbar support, etc.)	0 (0%)	119 (80,9%)	17 (11,56%)	11 (7,48%)
Standing without walking	7 (4,8%)	8 (5,4%)	16 (10,9%)	116 (78,9)
Walking	144 (98,0%)	2 (1,4%)	1 (0,7%)	0 (0%)
Walking while climbing or under different levels (steps, stairs, ramp, etc.)	140 (95,2%)	6 (4,1%)	1 (0,7%)	0 (0%)
Kneeling / squatting	142 (96,6%)	5 (3,4%)	0 (0%)	0 (0%)
Lying on your back or on one side	146 (99,3%)	1 (0,7%)	(0%)	(0%)

**Table 5:** Distribution of job positions and actions.

**Source:** self-made.

Regarding the postures and the actions of the work, the employees indicated that the sitting position is maintained between 30 minutes and two hours, standing without walking for more than 4 hours. Similarly, walking, kneeling and lying on the back, are positions that take less than 30 minutes during the workday.

Variable		Frequency	Percentage
Assessment of the physical demands of the job	High	45	30,6
	Low	8	5,4
	Moderate	89	60,5
	Very high	4	2,7
	Very low	1	,7
	Total	147	100,0

**Table 6:** Description of the assessment of the physical requirements of the job.

**Source:** self-made.

The perception of workers about the physical demands of the job is that they are generally moderate (60.5%) followed by high with 30.6%.

## Conclusion

The main musculoskeletal disorders presented by the population under study are unspecified and postural low back pain, painful shoulder, rotator cuff syndrome, carpal tunnel syndrome and cervicalgia.

The ergonomic risk factors found were forced and static postures of up to 8 hours a day, exposure to vibrations at the time of passenger transport, exposure to environmental and passenger noise, manual weight manipulation, physical and mental fatigue.

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