

## Research Article

# Economic and Labor Impact due to Temporary Incapacities Secondary to Orthopedic Injuries in Torreon Mexico

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## Abstract

**Background:** The orthopedic pathologies are all those alterations of the musculoskeletal system at the bone or soft tissue level that cause functional disability due to pain or deformity. Orthopedic pathology affects physical, economic and social activity; in some cases, workers are incapacitated to lead an independent life and a paid job. The Mexican Social Security Institute (IMSS) provides medical services and economic benefits through temporary incapacities for work, thus providing social welfare; however, the economy is a critical point in this institution.

**Aim:** So the purpose of this study is to determinate the economic impact secondary to temporary incapacities issued by orthopedic injuries in workers affiliated to IMSS in Torreon, Coahuila.

**Design and Setting:** Comparative cross-sectional study.

**Methods:** In 139 patients with prolonged incapacities secondary to orthopedic injuries during 2012-2013 in a family medicine unit in Torreon, Coahuila, medical and work information was obtained that included: age, gender, time of affiliation to IMSS, type of work, disability time, body mass index, body area affected and medical history of comorbidities. It was used 80% statistical power and 95% interval confidence; association was established by calculating odds ratios, chi-squared test for statistical significance ( $p < 0.05$ ).

**Results:** 66% were men; main orthopedic causes were chronic low back pain (61.2%), painful shoulder syndrome (20.1%) and carpal tunnel syndrome (6.5%). The association between days of disability with type of job and affected area showed: type of job (type III-IV) [OR=2.7, 95%CI (1.2-5.8),  $p < 0.009$ ]; affected area (spine) [OR=1.1, 95%CI (0.5-2.1),  $p < 0.77$ ]. Total mean cost was \$15,429.94 per worker.

**Conclusion:** There is economic and labor impact due to temporary disability attributed to orthopedic injuries.

**Keywords:** Disability; Orthopedic Injury; Low back pain

## Introduction

Orthopedic disorders are all those alterations of the musculoskeletal system at the bone or soft tissue level that cause functional disability due to pain or deformity. Orthopedic pathology includes other type of illness that affect the work, economic and social activity of the individual. The incidence of these conditions carries functional consequences that result in disabled individuals and in some cases incapacitated to lead an independent life and paid work [1]. Lumbar spine pathology is the central point of multiple epidemiological studies in young people and adults, but also in the business sector due to the labor repercussions that represent. Low back pain is one of the most frequent conditions that the family physician and orthopedic specialist must face in the daily consultation. It is considered that every year about 50% of the working people suffer an episode of this disease and 80% of the population in general will suffer at least one acute low back pain [2-3].

Work environment factors that are related to orthopedic injuries include: physically heavy work, static work postures, frequent trunk flexions, powerful and lifting movements, repetitive work and vibrations. All these factors increase the mechanical load and frequently the orthopedic injuries are secondary to a combination of these movements [4]. Lumbar spine injuries in the workplace are rarely caused by direct trauma, usually are caused by overexertion with muscle compensations in the trunk that contribute to lumbar pain [3]. Low back pain can affect 84% of people in lifetime (range 11-84%). This suggests that 9 out of 10 subjects will have low back pain in lifetime; however, that event may be resolved and not resubmitted. In the case of chronic low back pain, several studies propose a prevalence of 15 to 36% [5-6]. According to the time of evolution, low back pain has been classified into three categories: Acute, if the symptomatology lasts less than six weeks; subacute, if it lasts from six to 12 weeks and chronic, when persists for more than 12 weeks [7].

There is no a definition of prolonged incapacity for work, since durations ranging from two weeks to 180 days are considered. The administrative criterion of IMSS is more than 30 days to consider prolonged temporary incapacity as known in the Federal Labor Law [8-9]. The granting of incapacities is responsibility of the social security institution (in Mexico the most important is IMSS), where the treating physician has the obligation to define diagnosis, prognosis and treatment of the patient in a defined time. It is important to mention that the daily minimum wage in Torreon is \$63.77 pesos [10].

Today, Torreon has a metropolitan area called the Comarca Lagunera, made up of municipalities in the states of Coahuila and Durango. In this city are located major industries such as the main lead smelter, silver refinery and the most important electrolytic zinc installation in Mexico and Latin America owned by Met-Mex Peñoles. The other important industry is the dairy company, which through LALA group concentrates a large volume of activities related to this industry. The rest of the industrial activities in Torreón are limited to textile (Wrangler, Hanes), electronic parts (Delphi) and automotive (John Deere, Metzeler, Jhonson Controls, Caterpillar) [11].

The use of drugs results in high costs for the institution that provides them, so prevention is widely recommended through the implementation of Ergonomics in companies, which is the technological discipline that is responsible for the design of workplaces, tools and tasks with the anatomical, psychological and capabilities of the worker. It seeks the optimization of three elements of the system (human-machine-environment) [12]. Based on the above, the main objective of this study was to determinate the economic impact secondary to temporary incapacities issued by orthopedic injuries in workers affiliated to IMSS in Torreon, Coahuila.

## Materials and Methods

A comparative cross-sectional study was carried out, in the family medicine unit #66, of the Mexican Institute of Social Security (IMSS), located in Torreon, Coahuila, Mexico; in patients with temporary incapacity for work secondary to orthopedic injury, which were selected from the department of occupational medicine in the years 2012-2013; that met the following inclusion criteria: affiliation to IMSS, temporary incapacity of work between the years 2012-2013; patients with incapacity of non-orthopedic origin were not included and eliminated those who did not have complete information. The following data were obtained directly from the medical records: age, gender, time of affiliation to IMSS, type of job according to Official Disability Guidelines, time of disability, average cost of disability in Mexican pesos, diagnostic, weight, height, body mass index ( $BMI = \text{weight}/\text{height}^2$ ), affected body area and medical history of comorbidities or chronic degenerative diseases as Diabetes Mellitus (DM) and arterial hypertension (HA).

The data obtained was integrated into data collection sheets and analyzed using the SPSS program version 20 in Spanish, where we applied descriptive statistics; for qualitative variables frequencies and percentages were used. It was considered statistically significant a  $p < 0.05$ , with a 95% confidence interval, all variables were dichotomized to apply odds ratio and chi square. The Protocol was authorized by the Local Committee of Research and Ethics in Health Research from

the Family Medicine Unit #66, where the study took place.

## Results

The study was carried out with a total of 139 patients who were incapacitated. Of these, 33.1% (46) were female and 66.9% (93) were male, the years of IMSS affiliation showed that 13.7% have less than one year of affiliation, 33.1% (46) 1-5 years, 15.1% (21) 5-10 years, 30.9% (43) 10-20 years and 7.2% (10) more than 20 years of affiliation (Table 1). The main orthopedic causes of prolonged disability were chronic low back pain (61.2%), painful shoulder syndrome (20.1%), and carpal tunnel syndrome (6.5%), all of these pathologies triggered incapacities of more than 30 days (Table 2). The ages of the economically active patients showed: 40.3% (56) have 21-30 years old, 38.1% (53) 31-40 years old and 15.1% (21) 41-50 years old (Table 3).

Chronic degenerative diseases found in patients with disability were diabetes mellitus 22.3% (31); hypertension 17.3% (24); dyslipidemia 10.1% (14); rheumatoid arthritis 1.4% (2); systemic lupus erythematosus 0.7% (1) and 48.2% (67) were apparently healthy (Table 4). In nutritional status according to BMI: 26.6% (37) had normal weight, 43.2% (60) overweight and 30.2% (42) obesity. We classify the type of work according to Official Disability Guidelines, 4.3% (6) had type I or light work, 23% (32) type II or moderate (cashiers, receptionists), 45.3% (63) type III or heavy and 26.6% (37) type IV or very heavy (construction workers) (Table 5). The body area most affected by diseases that caused prolonged incapacity were:

**Table 1:** Years of affiliation of workers affiliated to IMSS with orthopedic injury.

Years of affiliation	N	%
Less than a year	19	13.7
1-5 years	46	33.1
5-10 years	21	15.1
10-20 years	43	30.9
Greater than 20 years	10	7.2

N: Frequency, %: Percentage.

**Table 2:** Major causes of orthopedic disability.

Type of injury	N	%
Low back pain	85	61.2
Painful shoulder syndrome	28	20.1
Carpal tunnel syndrome	9	6.5
Gonarthrosis	8	5.8
Cervical Pain	3	2
Ankle sprain	3	2
Fracture	3	2

N: Frequency, %: Percentage.

**Table 3:** Age group of patients with orthopedic injury.

Age	N	%
16-20 years	8	5.8
21-30 years	56	40.3
31-40 years	53	38.1
41-50 years	21	15.1
51-60 years	1	0.7

N: Frequency, %: Percentage.

**Table 4:** Comorbidities in patients with orthopedic injury.

Comorbidities	N	%
Diabetes Mellitus	31	22.3
Hypertension	24	17.3
Dyslipidemia	14	10.1
Rheumatoid arthritis	2	1.4
Lupus	1	0.7
Apparently healthy	67	48.2

N: Frequency, %: Percentage.

**Table 5:** Type of job in patients with orthopedic injury.

Type of job	N	%
Type I	6	4.3
Type II	32	23
Type III	63	45.3
Type IV	37	36.6
Type V	1	0.7

N: Frequency, %: Percentage.

**Table 6:** Main causes of orthopedic disability and disability days.

Type of injury	Less than 30 days	30-60 days	Greater than 60 days
Low back pain	32	36	17
Painful shoulder syndrome	8	16	4
Carpal tunnel syndrome	5	3	0
Gonarthrosis	4	4	1
Cervical Pain	3	0	0
Ankle sprain	3	0	0
Fracture	1	2	0

53.2% (74) spine (cervical, dorsal or lumbar), 27.3% (38) arms and 19.4% (27) legs. According to the diseases investigated in our medical unit, we found that 40.3% (56) had less 30 days of disability, 43.9% (61) 30-60 days of incapacity and 15.8% (22) more than 60 days disability (Table 6).

The following results were obtained for the association of disability days with type of work and body area affected (Table 7): type of job (type III-IV) [OR=2.7, 95%CI (1.2-5.8), p 0.009], affected body area (spine) [OR=1.1, 95%CI (0.5-2.1), p 0.77] (Table 7-8). Prolonged incapacity and total cost are higher in disability due to work risk with 15.7% of patients, resulting in an average cost per worker of \$18,636.21; disability due to general illness was granted to 84.21% of patients, obtaining an average cost per worker of \$12,223.68. The total average cost was \$15,429.94 per worker (Table 9).

## Discussion

The main objective of this investigation was to determinate the economic and labor impact due to temporary incapacities attributable to orthopedic injuries in patients of the family medical unit #66, Torreón Coahuila, we reviewed 139 files of patients with prolonged incapacities secondary to orthopedic pathologies that are most commonly in family physician consultation. The importance of economic analysis in patients with incapacity for work within the health system is relevant because of the impact on institutional

**Table 7:** Association between type of job and days of disability in patients with orthopedic injury.

Variable		Days of disability (Greater than 30 days)		Days of disability (Less than 30 days)		OR	95% CI	p
		N	%	N	%			
Type of job	Type III-V	67	80.7	34	60.7	2.7	1.2-5.8	0.009
	Type I-II	15	19.3	22	39.3			

N: Frequency, %: Percentage, OR: Odds Ratio, CI: Confidence Interval, p: Chi Square.

**Table 8:** Association between affected area and days of disability in patients with orthopedic injury.

Variable		Days of disability (Greater than 30 days)		Days of disability (Less than 30 days)		OR	95% CI	p
		N	%	N	%			
Body area affected	Spine	45	54.2	29	51.8	1.1	0.5-2.1	0.77
	Another area	38	45.8	27	48.2			

N: Frequency, %: Percentage, OR: Odds Ratio, CI: Confidence Interval, p: Chi Square.

**Table 9:** Average cost per worker according to type of disability.

Type of disability	Cost per day	Mean days	95% CI	Mean cost per worker	Total Mean cost
Risk of work	\$270	69	56-81	\$18,636.21*	\$15,429.94*
General illness	\$216	56	50-62	\$12,223.68*	

CI: Confidence Interval, \*: Mexican pesos.

resources due to disability.

In Mexico, the Medical Disability Advisor (MDA) determines the payment of the salary in case of incapacity for work; for work risk, 100% of the salary is granted from the first day of absence or if it is due to general illness; it is granted 60% of the salary from the fourth day. The main orthopedic causes that cause prolonged incapacity in our study were: 61.2% chronic back pain, 20.1% shoulder syndrome, 6.5% carpal tunnel syndrome, 5.8% gonarthrosis, 2.2% ankle sprain and 2.2% fractures.

The lifetime prevalence of low back pain, according to Saldívar et al (2002) is higher between 30 and 39 years of age and in the male gender, our results are similar since there was predominance in the second decade of life and in the male gender. These results may be due to type of work activity they perform. It is estimated that the worker with low back pain is given up to 102 days of disability on average, resulting in a cost of 250 dollars per event, coinciding with the days reported in the present study [13]. Obesity is a health problem that in the last decade has increased alarmingly, the study by Merskey et al found that 90% of patients who presented low back pain chronic disease have overweight and obesity, and there may be a direct association between orthopedic pathologies, but without being able to demonstrate that obesity causes them. In our study we found that 73.4% of the patients were overweight or obesity.

When estimating the average cost of care for patients with orthopedic diseases, it is considered high with \$15,429.94 Mexican pesos only in our medical service unit, in the rest of the country results can be very high, mainly because the productive work life stops; a situation that is aggravated when the patient is incapacitated in a prolonged way. This result is similar to Covarrubias et al (2010)

which reports that in Europe, 12% of the population has a disability associated with low back pain, generating a cost per event of US \$101.66, or in the USA where the incidence of incapacities due to low back pain and carpal tunnel syndrome is 50% by the economically active population, with a direct medical cost of 50,000 million dollars annually [14].

Covarrubias et al (2010) found that 13% of the population (age 20 to 59 years old) attending to family medicine units requesting incapacity for work because of orthopedic injuries [14]. The difference costs in the types of disability is presented by the percentage that they receive from the salary quoted and the number of days granted for incapacity, which is related to the diagnosis and evolution of the pathology in patients.

## Conclusion

According to our hypothesis, there is an economic and work impact due to temporary incapacity attributed to orthopedic injuries because we found that 78.4% of the individuals studied had ages between 21-40 years, mostly males, economically active, causing important work absenteeism with ranged from 30-60 days. The total average cost per disabled worker, whether due to work risk or general illness was \$15,429.94 Mexican pesos.

Within the orthopedic injuries that cause prolonged incapacity, the main ones are pathologies derived from type III or heavy work. 61.2% chronic low back pain, 20.1% painful shoulder syndrome, 6.5% carpal tunnel syndrome, 5.8% gonarthrosis, 2.2% ankle sprain and 2.2% fractures; All these pathologies triggered incapacities of more than 30 days. Risk factors include overweight combined with obesity in 65.5% and chronic-degenerative diseases with 39.6% (diabetes mellitus and hypertension). In terms of time worked within companies the interval ranges from five to twenty years approximately in 64%; however, it is alarming that 13.7% of patients with prolonged disability had an affiliation less than one year in IMSS.

## Recommendations

1. Training to attending physician for attachment of the Clinical Practice Guide of the main pathologies treated in this study.
2. Improve monitoring and management of MDA guide.
3. Propose the elaboration of an improvement plan with objective of conducting the work reintegration.

4. Continue with other lines of research that include disabilities, to try to reduce the costs.

5. To determine the existing risk factors in different areas of work that negatively affects the behavior of worker and production.

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