



Carpian tunnel syndrome: the labor disease of the 21st century

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Abstract Introduction: The occupational disease refers to the personal injury that the professional can suffer as a result of the performance of his profession. Among the occupational diseases presented in people who work in offices, nurses, sewers, textiles, flower growers, packers and other jobs that require force and continuous and repetitive movements, is carpal tunnel syndrome, which consists of a neuropathic compression of the median nerve at the wrist level. Objective: To know and deepen the symptomatology of Carpal Tunnel Syndrome and its repercussion in the workplace. Methodology: An electronic search was carried out in the databases of online journals such as ScIELO, Redalyc, web search engines such as Google and complementary information from the University of Cartagena database. Results: During the selection and examination of several articles it was possible to collect information and to deepen the symptoms of the Carpal Tunnel Syndrome and the close relationship that it has with the work environment, since at present it is a disease classified as of work origin. Conclusion: It was found that, despite having an established belief that working conditions, especially repetitive manual labor, are important factors that increase the risk of CTS, the evidence is not yet sufficient to make such a statement, the studies have not been conclusive and the diagnostic tests are not sufficiently specific of this pathology.

Keywords Carpal tunnel syndrome, disease, labor, factors, risk

Introduction

It is enough to refer to Carpal Tunnel Syndrome (STC) to understand that it is the pathology that affects workers from all over the world with different symptoms within the population. This condition is characterized by the discomfort generated by the median nerve when it is frequently irritated by the entrapment of the nerve in the carpal tunnel, at the level of the hand and wrist [1]. Although authors such as Levine et al [2] mention that this event affects 1% of the population, Hagberg et al [3] mention that higher values have been found in workers in certain areas such as packers, which is an important factor when studying people with specific work activities involving the use of hands in repetitive movements. Over the years different researchers have been dedicated to studying the presence of this event, its associated causes, and its means of treatment. Likewise, we have established the main factors that predispose the presence of the disease and the mechanisms of intervention according to the severity of the case [1]. There is an abundant variety of investigations that have investigated on extra-occupational causes for CTS, are related from the workplace, in which it is sought to determine the responses to different pharmacological and therapeutic treatments [4]. Biomechanical work risks are related to a significant percentage of the burden of the disease worldwide. This is not uniquely identified with the suffering for the worker and his family, but also the economic loss to society due to the increased use of resources in health and an increasingly diminished productivity [5]. According to data from the International Labor Organization (ILO), occupational diseases and work-related accidents cause two million deaths, whose cost to the global economy amounts to 1.4% of the Global Gross



Domestic Product. In addition to the payment of compensation, mainly assumed by the health system, the society as a whole must face other expenses as a result of these events, among which are: decreased competitiveness, early retirement, absenteeism, unemployment and the decrease in household income [6,7].

Occupational diseases have been considered as producers of onerous events, due to the high value that preventive entities must bear, while taking into account direct medical costs, indirect costs related to loss of production, opportunity costs, investments and intangible costs such as: pain, suffering and interruption in the career, without counting the negative consequences for the home of the affected worker [8]. Another way to evaluate these costs has to do with the point of view for the analysis of the information, this can be from the worker, the insurer or financier of health, the company or the society as a whole. It is necessary to consider all the previous perspectives since it can lead to changes in costs or consequences to be included in the analysis [9].

In Colombia, STC is one of the diseases that is most frequently consulted. Consequently, in 2007, the Ministry of Social Protection implemented the "Comprehensive Guidelines for Occupational Health Care based on Evidence" (GATISO) to perform the diagnosis, treatment and rehabilitation of occupational diseases. In the volume related to musculoskeletal disorders, the following is reported: "carpal duct syndrome is consolidated as the first cause of occupational morbidity in the contributory regime. This pathology changed from representing 27% of all diagnoses in 2001, representing 32% of the diagnoses performed in 2004, presenting a continuous trend to increase "[10]. On the other hand, in a study carried out during 2005 on musculoskeletal pain and its association with ergonomic risk factors in administrative workers, a survey of 145 workers was carried out. The findings highlight that the most prevalent symptoms are lumbar pain (56%) and cervical (49%), and 30% of the population surveyed had painful wrist symptomatology [11]. For the surveillance epidemiology of carpal tunnel syndrome, the National Institute of Occupational Safety and Health NIOSH mentions elements of interest in the diagnosis of this pathology as the symptoms suggestive of CTS; physical signs and electromyographic changes accompanied by a high-risk employment history for this syndrome, without ruling out that women are the most sensitive to CTS [12].

Ergonomic education is a preventive measure, and effective, to avoid risk factors. Treatment of carpal tunnel syndrome is only effective when reducing or eliminating exposure to ergonomic risk factors. Treatment of patients with carpal tunnel syndrome should be initiated by removing the source of risk to which the worker is exposed; may also include physical therapy, medication, splint use, behavioral and occupational interventions, and, in severe cases, surgery to decompress the carpal tunnel [13].

Materials and Methods

Type of study: Thematic review in which review articles were included among other information collected from online search engines.

Type of participants: Articles published for review, reflection and studies that clearly show the topic addressed.

Bibliographic search strategies: An electronic search was conducted in the databases of articles from online journals such as Redalyc and SciELO.

Methods of review: initially the articles were chosen by name and abstract, then the full text of the documents previously chosen from the databases was examined.

Results

Carpal Tunnel Syndrome (STC) is the entrapment of the median nerve at the wrist level. It is the most frequent entrapment neuropathy within the peripheral neuropathy of the upper limb (acrosparesthesia). Although the disorder occurs in the wrist, the main symptoms are referred to the hand, and may be bilateral in 50% of patients. It is more frequent in the female sex in a proportion of 7 to 1, between 40 and 60 years, without a clear occupational component [13,14].

The STC is a condition caused by an increase in pressure on the median nerve at the wrist level, it is uncertain to consider that its appearance obeys exclusively labor factors; without mentioning degenerative diseases, rheumatic diseases, collagenosis, endocrine diseases, infections, congenital anomalies and history of gynecological surgery, among others as possible activators of the symptomatology. In a percentage that fluctuates around 15%, there is a



specific demonstrable cause: sequelae of wrist trauma, especially poorly consolidated wrist fractures (Colles fracture) and labor activity that combines strength, repetition and resistance [15, 16].

Carpal tunnel syndrome in the workplace

STC can be both caused and exasperated by work [17]. The wrist deflection posture in the flexion extension plane is shown as a risk factor for musculoskeletal disorders present in regular typists and writers [18].

The 520,000 novelties in US workers with work-related musculoskeletal conditions were ratified as a high-alert figure in 1988 where cases with carpal tunnel syndrome also occurred [19]. In another study in Europe, 6,943 workers were used, with prevalence of 4.8% compromising the median nerve, with the prevalence of nocturnal paresthesias among those evaluated being at 1.4% [20]. The majority of employed patients presenting with carpal tunnel syndrome, relate the work to the injury [21]. Work for years with precision activities with hands and fingers are possible risk factors for carpal tunnel syndrome [22]. Thus, manual manufacturing has a higher percentage of STC in the workplace, and the number of cases among workers employed in hospitals, fruit shops and insurance companies is also higher [23]. A study conducted in the United States involved 1,142 apprentices in construction-related work, Rosecrance *et al.* Found that the prevalence of carpal tunnel syndrome in apprentices is 8.2%, being higher in metal workers (9.2 %) and demonstrating that many construction workers begin to develop symptoms of carpal tunnel compression during their apprenticeship [24]. In another investigation conducted in the United States with 84 workers in an automobile assembly company, 18 subjects reported the presence of symptoms in the right hand, consistent with carpal tunnel syndrome [25]. Repeated and forced use of wrist and finger flexion movements may be an occupational risk factor for carpal tunnel syndrome [26]. Employees, who use alternately increase and decrease strength in repetitive work, develop an extra risk of presenting carpal tunnel syndrome. These jobs include secretaries, typists, health care personnel, nurses, industrial workers, and home services [27]. In the workplace, exposures to adverse forces, repetitions, vibrations, and certain postures are risk factors for developing carpal tunnel syndrome [28]. In a prospective study carried out in Denmark, with a follow-up of 731 participants performing repetitive manual work, Thomsen *et al.* Demonstrated that repetitive manual work was highly associated with carpal tunnel syndrome, resulting in the prevalence of the syndrome of 1.6% in the hand with which they did the work, and 0.7% in the other hand [29,30]. Different studies highlight the presence of chronic injuries in muscles, tendons and nerves, associated with work [31,32]. In a study by Wong *et al.*, With office workers diagnosed as repetitive stress injuries or carpal tunnel syndrome, and who were handicapped by pain in hands or fingers, lower cervical and mid-scapula, researchers found that these patients had inadequate head and neck posture and rounded shoulders [33,34].

Table 1: Social, occupational, and health conditions related to carpal tunnel syndrome

Acromegaly
Physical activity
Rheumatoid arthritis
Self-steering wheelchair
Alcohol consumption
Climbing sport
Hormonal disorders
Mellitus diabetes
Age
Pregnancy
Genetic factors
Environmental Factors
Fracture of Colles
Bone mass index
Lymphedema by mastectomy
Dislocation of semilunar bone
Menopause



Obesity
 Occupation
 Osteoarthritis in carpus and metacarpal joints
 Belonging to a family with a history of diabetes
 Smoking
 Working in very cold temperature environment
 Repetitive manual work
 Jobs alternating continuously increase and decrease of force
 Works that associate vibrations
 Cumulative wrist trauma
 Excessive use of hands

Source: Doyma Magazine Article.

Evaluation

The methods for estimating rates of occupational diseases and deaths resulting from it are due to the multiplicity of causes, including health risk factors related to lifestyles and long periods of latency, a situation that makes it difficult to know if they are related to the work environment [35]. There is a need to demonstrate more causal aspects of the syndrome [36-40].

Table 2: Classification for the diagnosis of carpal tunnel syndrome

Classic

Pain, tingling, numbness, and / or decreased sensation with
 Or without pain on at least two of the fingers 1, 2 or 3.
 No symptoms on the palm or back of the hand. Fifth finger symptoms,
 Wrist pain, or radiation proximal to the wrist may also be present.

Probable

Same as the classic type, except for palmar symptoms
 Unless it is reduced only to the ulnar aspect.

Possible

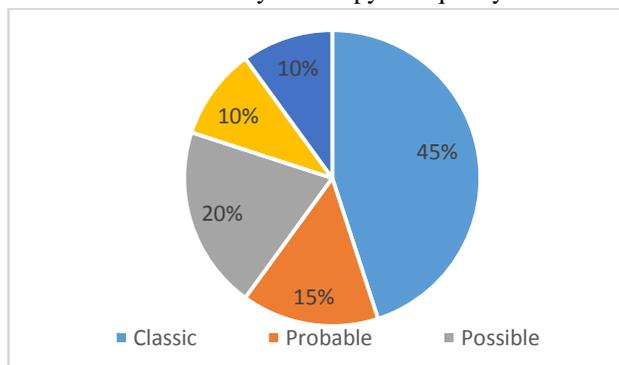
Pain, tingling, numbness and / or reduced sensation
 in at least one of the fingers 1, 2 or 3

Unlikely

No symptoms on the fingers 1, 2 or 3

No symptoms

Source: Gómez A. Pain evaluation. Physiotherapy and quality of life 2001



Graph 1: Diagnosis of carpal tunnel syndrome

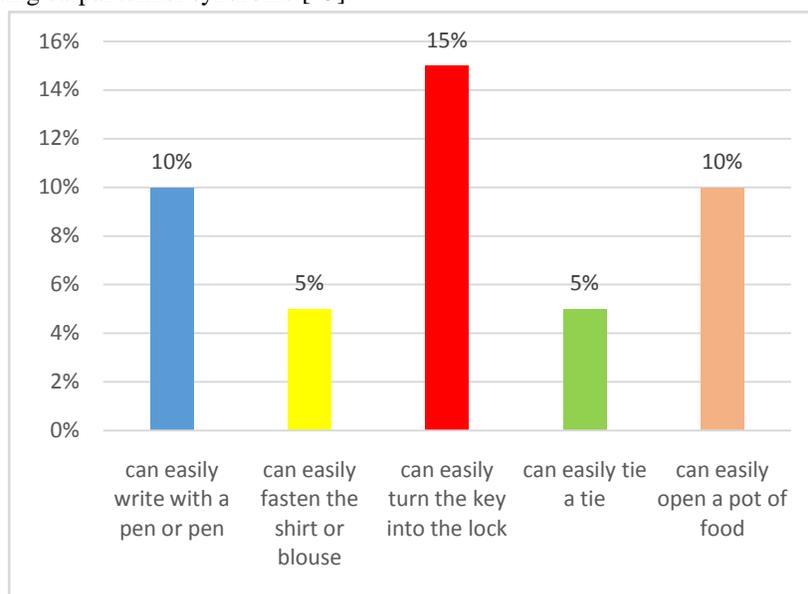
Source: Gómez A. Pain evaluation. Physiotherapy and quality of life 2001



The self-management of a patient survey of the hand chart for STC diagnosis, coding and classification [41] is included in the contest for the identification and diagnosis of STC (Table 2). In addition to adequate assessment of pain, function, and overall health [42], exploration includes both provocation test and sensitivity and tenacity test (Fig. 1). At the beginning of the process, there is a deterioration in the sensation of distribution of the median nerve, especially in the index and middle. In case of presenting atrophy this is detected in the tenar eminence. Likewise, weakness can be detected in the abductor of the thumb due to the nerve compression maintained over time [43].

Damage to the nervous level and atrophy in movement are manifestations that reveal the loss of muscular volume and deterioration of the muscles that demonstrate an increase in the pathology, which damages the performance of the worker, which are not constant in normal conditions [44].

In this evaluation performed by self-reports performed by the patient, the Davis et al scales for the measurement of physical and mental distress felt by the patient, as well as the functionality of the wrist and fingers (graphic 2), are highlighted. Presenting carpal tunnel syndrome [45].



Graph 2: Assessment of carpal tunnel syndrome. Functional scale of wrist and fingers

Source: Davis PT. Rv. Doyma, 2011.

In the workplace, the evaluation of the patients requires obtaining information about the injury, the examination of the same, and to know the adverse ergonomic exposures both inside and outside the work. Treatment of carpal tunnel syndrome can only be effective when exposures to ergonomic risk factors are reduced or eliminated [46].

Conclusion

Early recognition of carpal tunnel syndrome, and ergonomic education on risk factors are considered preventive measures [15]. During practice with repetitive movements, it is imperative to avoid exerting force, exposing oneself to vibration or adopting inappropriate postures in order to considerably reduce the appearance of damage to the hands by the typical risk factors of CTS and to avoid their appearance [47]. The interdisciplinary work that links therapists for their active intervention in the design of a job more adapted to the man and less rigid that facilitates the conditions of the workers, between these options is the configuration of the keyboard for a computer position, that also maintain a neutral wrist position to prevent work-related skeletal muscle disorders such as wrist tenosynovitis and carpal tunnel syndrome [48].

Studies such as the one advanced by Falkiner and Myers state that people are responsible for their health, so they must learn to lead a healthy lifestyle by preventing risks related to carpal tunnel syndrome, such as obesity, diabetes smoking, consumption of alcohol, and even those intrinsic at work [49,50].



In the workplace, carpal tunnel syndrome can be caused and aggravated by occupation and work, and most of the employed patients with carpal tunnel syndrome relate work to injury [25].

In carpal tunnel syndrome, pain and sensitivity, as well as functionality, nerve involvement, and overall condition of the patient must be assessed. For this, maneuvers of provocation of the symptomatology, self-reports, questionnaires, and electrophysiological studies are used. It is also required to know the adverse ergonomic exposures both inside and outside the work [42].

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