Role of P.T in Rehabilitation of Carpal Tunnel Syndrome From physiotherapists prospective of view

Lutfia Ali Ellsahli
Fatima Abdullah Ben Rabaa
Khawla Ali Tloobh
Wedad Bashir Dahab
Corresponding author: Lutfia Ali Ellsahli,
Department of Physiotherapy,
Faculty of Medical Technology,
Misurata. Libya
lutfiaellsahli@gmail.com,

Abstract— Carpal Tunnel Syndrome (CTS) is a prevalent medical disorder characterized by numbness and pain and tingling in the hand and arm of the affected paten , CTS happens when the median nerve is compressed as it travels through the wrist.The current study aims at determining the physiotherapy methods that used in treatment of Carpal Tunnel Syndrome as well as describing factors associated with carpal tunnel syndrome Methods: A cross sectional study was conducted on 194 physiotherapists who worked in government and private hospitals and clinics in Misurata city from November to May 2025, the data were collected using questionnaire to collect responses from the study population regarding the physiotherapy rehabilitation of Carpal Tunnel Syndrome, based on insights drawn from various previous studies, a preliminary version of the questionnaire was designed. Results: The results indicated that physical therapy is the most commonly applied intervention for CTS cases, accounting for 50% of responses. Surgical treatment ranks second with 29.4%, while pharmacological treatment represents the least frequently used approach. In addition, the therapeutic methods adopted for the rehabilitation of CTS patients results reveal that therapeutic exercises are the most commonly used rehabilitation method, cited by 27.7% of respondents, this is followed by ultrasound therapy (21.1%). However, the electrical stimulation and therapeutic massage share an equal rate of 16.8% each. Laser therapy was reported by 9.5%, and the use of medical splints by 6.8%. Other less commonly mentioned techniques (1.3%) including cryotherapy, heat therapy, infrared radiation, and shockwave therapy. Moreover, the results indicated that the effectiveness of physical therapy in improving movement is perceived as "Effective" by the largest proportion of respondents (38.7%), followed by "Very effective" (36.1%), and "Moderate" (18.6%). Lower ratings included "Weak" (3.6%) and "Not effective" (3.1%), which were the least cited..**Conclusion**: Physiotherapy plays an important role in treatment and rehabilitation of CTS as well as combining physical therapy with other medical strategies can improve the outcomes of the patients.

Keywords— Carpal tunnel syndrome, median nerve, physiotherapy, rehabilitation.

Introduction:

Carpal Tunnel Syndrome CTS: is a prevalent medical disorder characterized by numbness and pain and tingling in the hand and arm of the affected paten .CTS happens when the median nerve is compressed as it travels through the wrist. There are a lot of Risk factors for CTS contain , repetitive wrist activity, obesity, pregnancy, rheumatoid inflammation and genetic heredity(Razali et al., 2022)

According to Vassil Levski",. et al.(2022) almost 3.8 %of people who complain of pain itching sensation in wrist and diminished fine motor skills in their hands have the condition of CTS, this condition associated with the compression of nerves (Median nerve) thumb, index, middle finger, and the radial side of the ring finger which is one of important nerves in upper extremities. In addition, Symptoms might be clinically classified as mild, moderate or severe and cases of CTS can be presented bilateral in approximately 0f 65%of cases(Burton et al., 2014). However, the literature reviewed shows that there is an evidence that hypothyroidism increases the severity of disease, This condition can be diagnosed by physical examination and applied electromyogram (EMG) test & nerve conduction study (NCS) with 60-84% sensitivity and more than95% specificity cases of CTS can also diagnosed depended on ultrasound sonography and MRI .(Eslami et al., 2019).

Recent literature reveals that CTS can affected hand sensory and motor function , these impairments can disrupt numerous daily activities, such as handling a phone, buttoning clothes, holding a book while reading, . women aged 40 to 60 years are more vulnerable to CTS compared to males, mainly due to having a smaller carpal tunnel(Fassaii et al., 2025).in addition The occurrence of CTS over a long time may also result in the muscles at the base of the thumb wasting away. Worldwide, an estimated 4% and 5% of people suffer from CTS, with the most vulnerable people being elderly individuals aged between 40 and 60 years. CTS is also more prevalent amongst women as compared to men. For instance, the UK General Practice Research Database in 2000 estimated the prevalence of CTS was 88 per 100,000 in males, while in women, the incidence was 193 per 100,0002. More frequent estimations of the incidence of CTS records its incidence to be higher for women aged between 45 and 54 years, while the risk is higher for men aged between 75 and 84 years4. CTS is considered as type of musculoskeletal

disorder associated with work activity in the pretentious individuals, which is caused by strain and repetitive activity, making it a common problem across manual workers(Anandabai et al., 2024).

Recent studies have identified that conservative managements should be considered as the first treatment method for patients with mild to moderate CTS Furthermore, a large number of patients with CTS try to avoid surgery and poverty to find other treatment options. Therefore , many studies try to find the best non-surgical methods for treatment of CTS. The use of manual therapy and therapeutic exercise techniques is considered part of the conservative treatments of CTS and positive effects of these methods have been reported in some studies(Talebi et al., 2020)

Commonly, there are several conservative treatment used in clinical include ultrasound therapy, LASER therapy, paraffin wax therapy, hand activities, and flexible wrist splints or kinesiotaping, local injection of corticosteroids (CSI), oral steroids, night splints (NS), electromagnetic field therapy , Occupational and cupping therapy. Physiotherapy intervention is one of the common conservative treatment in managing CTS. Moreover, P.T can relieve patient symptoms, decrease pain and improve hand function as well as enhance quality of life, Physiotherapy is a sensibly cost-effective, non-invasive, easy to-apply, and frequently used therapeutic approach for CTS patients.(Razali et al., 2022).

2-Methods:

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2.1 Research Procedures:

This section provides a precise and detailed description of the research procedures followed by the researchers. It outlines the research methodology adopted, the target population, the data collection instrument along with the stages of its development, the timeline for its implementation, and the statistical methods used.

2.2 : Research Methodology

After reviewing the relevant literature and previous studies, the researchers adopted the descriptive-analytical approach due to its suitability to the nature of the research problem, which focuses on the role of physical therapy in the rehabilitation of Carpal Tunnel Syndrome.

2.3: Research Sample

In alignment with the objectives of this study, the research population consists of male and female physical therapy specialists across Libya, totaling 194 physical therapists

2.4: Research Instrument

The research instrument used for data collection was a structured questionnaire, which comprised four sections: A section on knowledge of Carpal Tunnel Syndrome (CTS) ,A section on therapeutic interventions ,A section on challenges and recommendations ,A section on opinions and evaluations of therapists .

The questionnaire includes a total of 18 items, with each item accompanied by multiple response options, where respondents were required to mark (✓) next to their selected answer.

2.5:Statistical Methods

To analyze the results obtained through the research instrument, the data collected from the field study were processed by organizing and coding the responses from the completed questionnaires. The researcher used Frequencies and Percentages

3-Results:

The study results reveal that the most commonly cited cause of Carpal Tunnel Syndrome is repetitive strain, accounting for 21.6% of responses. This is followed closely by incorrect work-related postures, which make up 20.8%. Hand injuries represent 11.8%, and arthritis accounts for 10.3%.

Wrist fractures were identified by 9% of respondents, while cervical spine issues were mentioned by 8%. Chronic conditions such as diabetes were cited by 7.2%. Pregnancy was reported by 5.7%, genetic predispositions by 3.4%, and thyroid dysfunctions by 1.3%.Table 1 Lastly, other causes—such as manual labor, obesity, and smoking—comprised only 0.8%, making them the least cited contributors

Table (1) : **Most Common Causes of Carpal Tunnel Syndrome**

Causes of CTS	Frequency	Percentage
Repetitive strain	132	21.6%
Work-related postures	127	20.8%
Chronic diseases (e.g., diabetes)	44	7.2%
Genetic factors	21	3.4%
Wrist fractures	55	9%
Arthritis	63	10.3%
Hand injuries	72	11.8%
Thyroid disorders	8	1.3%
Cervical spine problems	49	8%
Pregnancy	35	5.7%
Other	5	0.8%

The findings indicate that the physical therapy is the most commonly applied intervention for CTS cases, accounting for 50% of responses. Surgical treatment ranks second with 29.4%, while pharmacological treatment represents the least frequently used approach at 20.6% Table 2.

Table2 **Therapeutic Interventions for CTS**

Therapeutic Interventions	**Frequency**	**Percentage**
Pharmacological treatment	**40**	**20.6%**
Physical therapy	**97**	**50%**
Surgical treatment	**57**	**29.4%**
Other	–	–
Total	**194**	**100%**

The results reveal that therapeutic exercises are the most commonly used rehabilitation method, cited by 27.7% of respondents. This is followed by ultrasound therapy (21.1%), while electrical stimulation and therapeutic massage share an equal rate of 16.8% each. Laser therapy was reported by 9.5%, and the use of medical splints by 6.8%.Other less commonly mentioned techniques (1.3%) included cryotherapy, heat therapy, infrared radiation, and shockwave therapy table 3

Table 3: Rehabilitation Methods Used for CTS Patients

Rehabilitation Methods	Frequency	Percentage
Therapeutic exercises	172	27.7%
Electrical stimulation	104	16.8%
Ultrasound therapy	131	21.1%
Therapeutic massage	104	16.8%
Use of medical splints	42	6.8%
Laser therapy	59	9.5%
Other	8	1.3%
Total	-	100%

The results in Table (4) indicate that the effectiveness of physical therapy in improving movement is perceived as "Effective" by the largest proportion of respondents (38.7%), followed by "Very effective" (36.1%), and "Moderate" (18.6%). Lower ratings included "Weak" (3.6%) and "Not effective" (3.1%), which were the least cited.table 4

Table (4) Effectiveness of Physical Therapy in Improving Mobility

Effectiveness Level	**Frequency**	**Percentage**
Not effective	6	3.1%
Weak	7	3.6%
Moderate	36	18.6%
Effective	75	38.7%
Very effective	70	36.1%
Total	194	100%

According to the present results, poor patient compliance with home therapy was identified as the most frequent cause of failure of physiotherapy (37.1%), followed by the severity of the condition or delayed diagnosis (34.5%). Surgical necessity accounted for 25.8%, while other reasons—such as surgical errors, local inflammation, or advanced disease stages—were the least reported (2.6%).

Table (5) Causes of Physiotherapy Therapy Failure

Cause of Failure	**Frequency**	**Percentage**
Poor adherence to home-based therapy	72	37.1%
Severity of the condition / late diagnosis	67	34.5%
Need for surgical intervention	50	25.8%
Other reasons	5	2.6%
Total	194	100%

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4-2 Discussion

Carpal Tunnel Syndrome (CTS) is recognized as a common condition of musculoskeletal disorder affecting both men and women, emphasizing the need for a clear understanding of its causes and effective preventive strategies(Razali et al., 2022).

The results of the present study indicate that the vast majority of physical therapists (88.7%) have experience treating CTS patients, highlighting the prevalence of this condition. In contrast, only 11.3% reported having no such experience. Among the most common causes of CTS, the leading factor was repetitive strain, accounting for 21.6% of responses. In contrast, less frequent causes (0.8%) included excessive medication use, obesity, and smoking these results are similar to the study conducted by (Eslami et al., 2019).The study further revealed that physical therapy is considered the primary treatment modality, favored by 50% of respondents. This finding aligns with *Study* of (Talebi et al., 2020) which reported that physical therapy is the first-line treatment in large number of CTS cases.

In terms of specific interventions, therapeutic exercises emerged as the most commonly adopted technique, selected by 27.7% of therapists, these findings underscore the importance of raising awareness about the causes of CTS, and they reinforce the critical role of therapeutic exercises as a fundamental component of management. Most studies have shown that the therapeutic effects of nerve- glide, and

tendon-glide exercises are more significant than other non-surgery interventions In a study conducted by Fassaii et al.,(2025) a greater effectiveness in reducing pain and hand functional impairments compared to ultrasound in patients with CTS was clearly shown. The confirmation of these effects, even in comparison with pharmaceutical treatment has the greater significance and effectiveness of these methods.

The current study shows the perceived effectiveness of physical therapy in improving movement and mobility among Carpal Tunnel Syndrome patients as well as decreased pain and numbness that is similar to results from Fassaii et al., 2025 study.

Moreover, the results indicate that a very strong correlation between therapeutic exercise and motor function improvement reported by 51% of therapists, followed closely by a strong correlation at 49.6%. Only a small minority indicated a weak correlation (1.5%) or no correlation at all (0.5%), highlighting a near-unanimous belief in the clinical efficacy of targeted exercises for CTS.

Based on the results obtained, it can be said that the perceived reasons for the failure of physical therapy in certain CTS cases were the greatest challenge reported as well as the lack of awareness among patients about the importance of physiotherapy, accounting for 35.6%. This was followed by poor adherence to home exercise programs (27.6%), and delayed diagnosis (18.8%). Economic and financial issues represented 13.6%, while insufficient equipment or tools was the least reported challenge at 4.3%.

Consequently, the present study supports a stronger focus on prevention and early intervention as key elements in CTS rehabilitation strategies .most commonly suggested precautions included:

- Avoiding physical overexertion and lifting heavy objects
- Maintaining proper hand and wrist posture
- Adhering to home exercise programs
- Limiting the use of the affected hand
- Taking vitamin supplements
- Wearing a wrist splint

Conclusion: CTS is a common, restricting, and painful condition, this condition could be treated conservative particularly for mild and moderate cases of CTS, Patients with severe symptoms or who fail to respond to physiotherapy and other non-surgical management are advised to refer to surgical management. Nevertheless, physiotherapy is considered as one of the most effective approaches, it is widely used as noninvasive and modest to use.

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Conflicts of Interest: The authors declare no conflict of interest.**References:**

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