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Knowledge of Evaluation and Rehabilitation of carpal tunnel syndrome among physical therapists in Saudi Arabia

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ABSTRACT

Introduction: Among the most prevalent entrapment neuropathies influencing the upper extremity, carpal tunnel syndrome (CTS) severely restricts daily activities. To our knowledge, no prior study has looked at how physical therapists in Saudi Arabica currently assess and treat individuals who have CTS. Therefore, the current research was conducted to evaluate the knowledge and practice of treatment of CTS among physical therapists in Saudi Arabica.
Method: This cross-sectional study utilized an online survey. Physical therapists (PTs) were contacted through social media channels like Twitter, Telegram, and WhatsApp. The questionnaire was distributed privately via direct messages to individual PTs. Descriptive statistics of frequencies, percentages were employed in presenting the participants demographic as well as clinical practice related knowledge.
Results: 415 Physical therapists in Saudi Arabia took-part in this study. 216 (52%) of subjects were males and 199 (48%) were females. 51.3% subjects were less than 29 years, 55.7% had 1-5 years of experience, 74.2% had B.Sc. and 57.3% worked in hospitals. The majority of participants had a good understanding of CTS, including its causes, symptoms, neurological features, main risk factors, diagnostic procedures, and treatment options. The study showed strong confidence (n = 369; 89%) of the respondents to treat CTS patients effectively. Education, manual therapy, myofascial release, as well as therapeutic exercise have been identified as treatment options for CTS by 64.8% of responders
Conclusions: Most participants demonstrated a strong understanding of CTS evaluation and treatment through consistently selecting accurate responses in scenarios and questions related to CTS.
Keywords: Health Knowledge; Clinical Practice; Syndrome; Wrist injury; Awareness

Introduction

Carpal Tunnel Syndrome (CTS) impacts approximately 2.7-5.8% of the population, with a higher prevalence among women, and stands as a significant contributor to upper limb impairment.[1] In Saudi Arabia, the prevalence of CTS is estimated to be 14% of general population.[2] The CTS leads to sensations of tingling, numbness, and pain in the hands and arms commonly affecting the thumb, index, middle, and ring fingers, primarily induced by the compression of the median nerve within the wrist.[3] These symptoms may weaken grip strength and hand function, potentially leading to muscle atrophy around the base of the thumb due to

chronic tendonitis. CTS span short and long durations, encompassing work absenteeism and healthcare expenses.[4]

The development of CTS is influenced by a mix of internal and external factors, particularly in occupations involving repetitive hand movements, forceful gripping, and awkward wrist positions, common among frequent computer users, manual laborers, and dentists.[5] Furthermore, various factors such as obesity, pregnancy, genetic predisposition, hypothyroidism, rheumatoid arthritis, or diabetes and inflammatory conditions all play a role in the development of CTS.[6]

Electrodiagnostic testing, a full medical history, and a physical examination are all necessary components of a full clinical assessment for the diagnosis of CTS.[7] A range of non-invasive and invasive surgical procedures are available for the treatment of CTS. A physical therapy is a conservative treatment that is generally acknowledged as a first-line management method of CTS.[8] Physical therapy often employs electro-physical methods such magnetic field treatment, ultrasound, and extracorporeal shockwave therapy (ESWT).[9]

It is crucial for physical therapists to keep themselves updated about the recent evidence regarding the rehabilitation of CTS which enables them to deliver appropriate patient care. Additionally, the physical therapists should be aware of occupational-related and general risk factors, methods of objective evaluation, and rehabilitation strategies. Few countries surveyed their physical therapists regarding the knowledge of CTS evaluation and rehabilitation. Till date, there is no survey conducted among the Saudi Arabian physical therapists of this sort. Hence, this is the first study to evaluate the knowledge of evaluation and rehabilitation of CTS among Saudi Arabian physical therapists.

Methods

Study design

Cross-sectional study; open survey use of an online questionnaire that has been used in a previous study.[10] The study was approved from the Institutional Review Board of Majmaah University (registration No. (HA-01-R-088). Before engaging in the study, every participant was required to give consent through the questionnaire. The questionnaire outlined the study's aims explicitly, ensuring transparency for all participants. To maintain the privacy of the participants, their identities were maintained confidential and anonymous, with only the research team having access to the provided responses.

Participants

A cross-sectional online survey with a non-probability snowball sampling technique sent between the months of August and November of 2023 to physical therapists in Saudi Arabia who have an active PT license and currently working in Saudi Arabia. After November 2023, no further attempts were made to collect survey responses. The sample size was calculate based on the following formula: $(n) = Z^2pq / e^2$, where n is the require sample size, Z – Abscissa of Normal curve (For 95% Confidence interval, Z =1.96), p – Estimate proportion of an attribute that is present in the population (p = 0.05), q – 1 – p, (1- 0.5 = 0.5), e – Sampling error (0.05).[11] Therefore, n = (1.96)2 (0.5) (0.5) / (0.05)2 = 384.16. After adding the attrition rate, the sample size was decided to be 400. Physical therapists (PTs) were reached out to via social media platforms such as Twitter, Telegram, and WhatsApp. The questionnaire was shared privately through direct messages to individual PTs on Twitter, PT groups on Telegram, and WhatsApp. PTs were assured that no personal information would be disclosed, and their involvement was voluntary. Each participant received a uniform message outlining the estimated survey completion time of 10 minutes, the study's objectives, and a hyperlink leading them to the survey. All participants provided informed consent before beginning the survey.

The Inclusion criteria were 1) Physical therapists practicing in Saudi Arabia; 2)

Minimum of 1 year of experience; 3) Minimum of Bachelor qualification in Physical therapy. The Exclusion criteria: 1) Unwillingness to participate in study; 2) In complete questionnaire.

Questionnaire

To assess the knowledge of physical therapists in Saudi Arabia regarding CTS, researchers obtained permission to use a well-established questionnaire that had been developed and validated in a previous study. The questionnaire developed by Scalise et. al [10] was used to determine the knowledge of CTS in this current study. The questionnaire focused on four key aspects: CTS pathology, diagnostic tools, therapeutic techniques, as well as outcome measures. The questionnaire consisted of 24 multiple-choice questions: 8 demographic questions and 16 CTS knowledge questions. One item regarding the geographic region of the participating Physiotherapist was modified to adapt Saudi Arabia. (Appendix 1)

Statistical analysis:

The gathered information was extracted, evaluated, encoded, and subsequently recorded into the SPSS software for analysis purposes. Descriptive statistics of frequencies, percentages were employed in presenting the participants demographic as well as clinical practice related knowledge. All statistical tests were conducted using the statistical package for social sciences (SPSS) version 25 for Windows.

Results:

Survey response

Out of the 954 individuals who were potential participants and received the survey, 500 participants completed the survey with a response rate of %52. Of the 500 participants, 85 individuals were excluded from the study due to not meeting the eligibility criteria (not a physical therapist licensed from Saudi Commission for Health Specialties (SCHS) (n = 30), not currently in practice (n = 20), and less than one year of experience (n = 35). Hence, a sum of 415 participants were encompassed in the analysis. The responding physical therapists were sourced from various cities spanning all regions of Saudi Arabia.

Demographic characteristics

415 physiotherapists in Saudi Arabia took-part in this study. 216 (52%) of subjects were males and 199 (48%) were females. The detailed demographic characteristics are shown in Table 1.

Table 1. Descriptive Characteristics of Physical Therapist (n = 415).

Characteristics	N (%)
Gender	
Male	216 (52%)
Female	199 (48%)
Age	
Less than 29 years	213 (51.3%)
30 to 39 years	178 (42.9%)
40 to 50 years	18 (4.3%)
More than 50 years	6 (1.4%)
Years of experience	
Less than 5 years	231 (55.7%)
5 to 10 years	111 (26.7%)
11-20 years	55 (13.3%)
More than 20 years	18 (4.3%)
Academic degree	
B.Sc.	308 (74.2%)
M.Sc.	67 (16.1%)

Ph.D./DPT	40 (9.7%)
Work setting	
Hospitals	238 (57.3%)
Private practice	168 (40.5%)
University (teaching – research)	9 (2.2%)
Field of work	
Musculoskeletal	213 (51.3%)
Neurorehabilitation	61 (14.7%)
Geriatrics	14 (3.4%)
Others	127 (30.6%)
Region	
Center	289 (69.6%)
Eastern	29 (7%)
Western	34 (8.2%)
Southern	38 (9.2%)
Northern	25 (6%)

The Knowledge of evaluation and treatment of CTS:

The majority of respondents (n = 348; 83.9%) correctly identified CTS as a neurological disorder resulting from increased pressure on the median nerve within the carpal tunnel and (n = 322; 77.6%) referring the disorder to the decrease in space within the carpal canal. Most of respondents (n = 307; 74%) correctly agreed that the risk factors were female gender, obesity, diabetes as well as pregnancy.

Regarding the symptoms, the majority of respondents (n = 288; 69.4%) accurately recognized alterations in sensitivity, tingling, and numbness in the thumb, index, middle, and medial aspect of the ring fingers. as indicative symptoms of CTS. Moreover, during physical examinations, (n = 209; 69.4%) respondents identified atrophy of the dorsal and palmar hand surfaces, involving thenar and hypothenar muscles. In evaluating a patient with CTS, (66.3%) of the respondents relied-upon clinical tests include Phalen's test, Tinel's sign, Functional Dexterity Test, and two-point discrimination.

A total of (n = 369; 89%) of respondents agreed that physical therapist is primarily responsible for treating patient with CTS. However, 46 (11.1%) reported that that physical therapist is not primarily responsible for treating patient with CTS. A number of 206 respondents (49.6%), use nerve and tendon glide techniques as an intervention. Furthermore, many respondents (64.8%) recommended a treatment approach that involve education, manual therapy, myofascial therapy, and therapeutic exercise. About half of respondents 220 (53%) reported that they would recommend or create an orthotic for the treatment of CTS patients. A percentage of 43.4% of respondents acknowledged the influence of central sensitization processes and psychosocial factors on CTS and adjusted their clinical practice accordingly. Yet, 72.8% of respondents believed that surgical procedures could be beneficial after conventional treatments failed.

Discussion

CTS is a frequent musculoskeletal disorder that can significantly impact an individual's quality of life.[12] Conservative treatment, including physical therapy, is often the first-line intervention for CTS.[13] However, there is lack of studies on the knowledge and practices of physical therapists in Saudi Arabia regarding the assessment and treatment of CTS.

This study aimed to evaluate the knowledge and practices of physical therapists in Saudi Arabia of CTS. In this study, the majority of respondents possess a solid understanding of CTS, its underlying mechanisms, and associated symptoms. Specifically, 83.9% of the participants

correctly identified CTS as a neurological disorder resulting from increased pressure on the median nerve within the carpal tunnel as described, was first reported by Sir James Paget in 1854 following his documentation of compression of the median nerve after a distal radius fracture.[14] Additionally, 77.6% of the respondents associated correctly the disorder with a decrease in space within the carpal canal. With a better understanding of the CTS's condition, physical therapists can offer more targeted and effective interventions to better patient outcomes and improved quality of life for individuals affected by carpal tunnel syndrome.

The diagnosis of CTS relies on thorough review of medical history, physical assessment, and electrophysiological evaluations.[15] In this study, the majority of the respondents utilize the history and physical examination to identified the CTS. Clinically, The individuals noted that patients typically report symptoms of tingling, numbness, abnormal sensations, and pain in the area supplied by the median nerve in the hand, often worsened at night, leading to sleep disturbances, but alleviated by shaking the hand.[3] In physical therapy, various diagnostic tests can be employed to induce CTS. For example, (1) Tinel's test involves lightly tapping the median nerve in the carpal tunnel area, resulting in tingling sensations in the nerve's distribution. (2) Phalen's test causes tingling in the median nerve distribution through full flexion (or full extension for the reverse Phalen) of the wrist for up to 60 seconds. (3) The carpal compression test entails applying firm pressure directly over the carpal tunnel, typically using the thumbs, for up to 30 seconds to replicate symptoms.[16] In this study, the majority of participants showed that they rely on these physical exams to evaluate the CTS. For further clinical examination, it is recommended to verify the clinical diagnosis of CTS through electrophysiological examinations, such as electromyography (EMG) and nerve conduction velocity (NCS) tests.[17] This study revealed that the majority of physical therapists understand the key risk factors for CTS, including female gender, obesity, diabetes, and pregnancy [10] which is crucial as therapists can educate patients on managing these factors.

The findings from the study also indicate that a significant majority of respondents, believe that physical therapists hold the primary responsibility for treating patients with CTS. This strong result of confidence in the role of physical therapists emphasizes the recognition of their expertise and capabilities in managing CTS cases effectively. Particularly, respondents indicated that education, manual therapy, myofascial therapy, and therapeutic exercise are the treatment tools for CTS. These findings suggest that physical therapists in Saudi Arabia are generally knowledgeable about the evaluation and treatment of CTS and are likely to provide appropriate treatment. Physical therapy is an excellent treatment for chronic CTS, as has been shown in earlier research.[18] On the other hand, it is noteworthy that a smaller proportion of respondents, specifically 11.1% (46 individuals), expressed a differing opinion, indicating that they do not consider physical therapists to be the primary healthcare providers responsible for treating patients with CTS. This minority viewpoint could stem from various factors such as differing perspectives on the scope of practice, varying levels of awareness regarding the role of physical therapists in CTS management, or potential preferences for other healthcare providers in the treatment of this condition.

The emphasis on education, manual therapy, myofascial techniques, and therapeutic exercise aligns with evidence-based practices in physical therapy for CTS. Education plays a crucial role in empowering patients with knowledge about their condition, self-management strategies, and preventive measures. In a study by Katz et al. (2005) involving 181 workers with Carpal Tunnel Syndrome (CTS), it was determined that for reducing work absences, a comprehensive approach to treatment incorporating educational components is essential.[19] Numerous ergonomic elements, like optimizing workstations, adjusting sleep postures, and adapting tool handles, can impact the pressure within the carpal tunnel. Enhancing awareness and understanding of task modifications can help address these factors effectively.[20] Manual therapy techniques can help address soft tissue restrictions, joint mobilization, and nerve

gliding to alleviate symptoms and improve function.[21,22] Myofascial therapy focuses on releasing tension in the fascia, potentially reducing pain and improving mobility.[23] Therapeutic exercises are vital for strengthening muscles, improving flexibility, and enhancing overall hand and wrist function.

The consideration of orthotic intervention by approximately half of the respondents reflects a common adjunctive approach in the management of CTS. Orthotics, such as wrist splints, can aid in relieving symptoms by maintaining a neutral wrist position, reducing pressure on the median nerve, and supporting the affected area during activities that may exacerbate symptoms. Splints are commonly recommended for nighttime wear but can also be employed during the day depending on a patient's work requirements. In a research study involving 14 women diagnosed with bilateral Carpal Tunnel Syndrome (CTS) through electromyography (EMG), the use of splints over a 12-week period led to notable electrophysiological enhancements in moderate CTS cases, with relatively lesser improvements observed in mild cases.[23]

By combining these approaches, physiotherapists aim to address the multifaceted nature of CTS, targeting not only symptom management but also functional improvements and long-term outcomes. The integration of educational components, manual therapies, therapeutic exercises, and orthotic interventions reflects a comprehensive and holistic approach to the treatment of carpal tunnel syndrome within the scope of physical therapy practice. These strategies are tailored to individual patient needs, aiming to optimize rehabilitation outcomes and enhance quality of life for individuals affected by CTS.

Limitation

Survey studies are susceptible to various limitations that can impact the accuracy and reliability of the data collected. One such limitation is the presence of social desirability bias refers to the tendency of survey respondents to adjust their responses to match societal norms or to portray themselves in a more positive manner. This tendency can lead to responses that are not entirely truthful or accurate, skewing the results of the study. Moreover, survey studies often face challenges related to sampling bias, in this study may not have full control over selecting a representative sample from the population of interest. This lack of control can result in a sample that does not accurately reflect the targeted population, compromising the generalizability of the findings. Furthermore, respondents' answers in surveys heavily rely on their recall memory, which can introduce errors due to forgetfulness or the tendency to guess when faced with questions that require remembering past experiences or details. These factors collectively highlight the importance of considering and addressing these limitations in survey design and data interpretation to enhance the validity and quality of the study results.

Conclusion

In this study focusing on the evaluation and treatment of CTS, the respondents demonstrated a commendable level of comprehension regarding the condition and its management. The majority of the participants exhibited a solid grasp of the subject matter by consistently selecting the accurate responses when presented with various scenarios or questions related to CTS evaluation and treatment. Their ability to choose the correct answers suggests a high level of knowledge and awareness regarding the appropriate diagnostic and therapeutic approaches for CTS. This proficiency among the respondents not only indicates a strong understanding of the condition itself but also implies a potential for effective clinical decision-making and patient care in the context of Carpal Tunnel Syndrome.

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