PREVALENCE OF CARPEL TUNNEL SYNDROME IN PROFESSIONAL GUITARIST

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Abstract:

One of the most widespread entrapment neuropathies that is afflicted by people engaged in repetitive hand and wrist movements is Carpal Tunnel Syndrome (CTS). The latter is especially dangerous to professional guitarists who have to practice long hours, make repetitive motions with their fret and strumming, and maintain postures of their wrists that cause higher intracarpal pressure. Although performance-related musculoskeletal disorders are becoming more well-known, there is very little epidemiological information on CTS in guitarists. Objective: To find out the incidence of Carpal Tunnel Syndrome (CTS) in professional guitarists and to examine the risk factors related to this condition including the age, years of playing, and the hours of practice.

Keywords:

Carpal Tunnel Syndrome, Guitarists, Repetitive Strain Injury, Boston Carpal tunnel Questionnaire, Musculoskeletal Disorders, Median nerve compression, Prevalence Study.

INTRODUCTION

Carpal Tunnel Syndrome (CTS) is extremely widespread and can attack the wrist and hand causing pain, numbness and a pins-and-needles feeling [1]. It is a health condition that occurs when the median nerve (the nerve that runs through the forearm to the palm) becomes compressed or aggravated as it runs through the carpal tunnel of the wrist [2]. This nerve is significant as it provides strength and sensation to the thumb and the first three fingers and hence any pressure on the nerve may result in difficulty of performing routine activities [3]. Repetitive motion of the wrists as well as strange positions of the hands are often associated with CTS [4]. This makes people, who use their hands a lot, such as musicians and to a certain extent, guitarists highly susceptible to this condition [5]. Guitarists, those are likely to develop CTS because of the requirements of the instrument [6]. Guitar playing entails repeated and regular movements of the fingers and wrists which are in posture and movement, repetition and they are frequently in awkward or strained posture [7]. Guitar playing may put pressure on the carpal tunnel due to awkward or sustained postures with the wrist (particularly when it comes to flexion or ulnar deviation) [8]. Flexor tendons and median nerve are strained by fine motor movements of the fingers and sustained flexion-extension of the fingers in the process of fretting or picking [9]. Repetition motions of strumming and fretting on the period of long practice gradually cause micro- trauma in the structures of the wrists[10].

These motions particularly occur when performed for a long time in practice or performance [11]. It may result in inflammation and pressure on the median nerve [12]. Repetitive wrist and finger movements lead to the flexor tendon inflammation in the small tunnel of the carpal causing greater pressure and compression of the median nerve, causing CTS [13]. CTS may severely reduce the playing and performance capabilities of professional guitarists, so it is a relevant issue in the music community [14].

One of the most common entrapment neuropathies that occur in the upper limb is the Carpal Tunnel Syndrome (CTS) [15]. It mostly entails the compression of the median nerve on its way through the tight osteofibrous canal in the wrist called the carpal tunnel [16]. The median nerve serves the sensory supply to the thumb, index, middle and half the ring finger and controls fine motor control of the hand, functions very vital in fine movement of hands, grip strength, and coordination [17]. Nocturnal pain, numbness, tingling, burning sensation, weakness and characteristic symptoms of any irritation, swelling or increased pressure in this tunnel [18]. With the modern digital and creative age, CTS has become an important occupational health issue of concern [19].

It is closely linked with repetitive movement of the wrists, prolonged awkward postures, subjecting to vibrations and performing actions that require fine motor control [20]. Therefore, people that need a lot of wrist and hand action in their occupation are most susceptible. Out of these, the artists, particularly the professional guitarists are becoming a high-risk group because of the rigorous physical requirements of their art [5]. Playing a guitar involves: repetition, precision, postural strain, and duration. Repetition: repeated squeezing, scratching and pounding. Precision: fine motor skills that are governed by flexor tendons of fingers. Postural strain: upright position with flexion or ulnar deviation of the wrist, which raises the pressure of the tunnel [8]. Duration: extensive work hours result in micro-trauma and inflammation of the tendon sheath [10].It has been suggested that the repetitive flexion-extension actions increase intra-carpal tunnel pressure to a large degree resulting in the swelling of flexor tendons, causing the further compression of the median nerve [12]. In the long run, this can cause chronic symptoms and impaired hand functioning [13]. In the case of professional guitarists, such symptoms may be devastating to the career [14]. Numerous musicians can also avoid treatment because they are frightened with a break in training and the condition becomes worse [19].

Although extensive literature has been conducted on CTS in office workers, industrial and generic workers and musicians, there is scanty epidemiological evidence on professional guitarists as a high-risk group [5]. Knowledge of the prevalence of CTS in this expert population is critical toward early diagnosis and identification [17], training of musicians on ergonomic hand position [8], prevention of physiotherapy-based interventions [18], and lessening work-related disability and illnesses [19]. Thus, research on CTS in professional guitarists has significance to the music and health industry [14].

Musicians spend hours and hours to perfect their mastery and make it fast and precise as well as expressive [7]. Nonetheless, this large volume physical activity is normally a strain to the human body particularly, the upper limbs [9]. Carpal Tunnel Syndrome (CTS) is one of the most widespread performance-related musculoskeletal diseases among musicians [1]. The carpal tunnel syndrome is a compressive neuropathy of the median nerve at the position of the wrist, in a limited anatomical area called carpal tunnel [16]. This small tunnel harbors nine flexor tendons and the median nerve thus it is very vulnerable to pressure buildup when

repetitive or forceful hand actions take place [13].The condition of Carpal Tunnel Syndrome is characterized by such symptoms as paresthesia (tingling), numbness, weakness of the grip, pain in the forearm, and loss of control [18]. Unattended, the condition may lead to thenar muscle atrophy and extreme functional loss [15]. The etiology of CTS is multifactorial and incorporates mechanical overload, repetitive micro-trauma, ergonomic stress and inflammatory changes in the flexor tendons [10]. Therefore, jobs that involve high demands of wrist movement like assembly-line employees, computer Professional guitarists are a very vulnerable group of people among musicians [5].

programmers and musicians are at risk [19].Guitar playing involves complex and extensive activities which entail flexion of the fingers, quick fretting, deviation of the wrist and extended holding of the guitar neck [8]. Physiological researches have revealed that the flexion of the wrist causes the pressure in the carpal tunnel to swell up to 8 times the normal condition [12]. Monotonous action of flexor tendons leads to swelling and friction [10]. Prolonged practice causes cumulative trauma [11]. These are the biomechanical and occupational conditions that predispose guitarist to median nerve irritation and chronic wrist dysfunction [13].Even minor impairment is harmful to professional guitarists in terms of the production of tone, speed, articulation, endurance, and performance on the stage, which can potentially ruin their career [14]. Although the requirements of playing guitar are physically demanding, the music industry has low level of awareness and preventive health measures [19]. Although much has been studied on CTS in general populations and occupational groups, there is limited information on prevalence in professional guitarists [5]. Most musicians will not pay attention to the initial signs and symptoms because they will be afraid of being crippled and thus they will be diagnosed late and will spend more time in rehabilitation [19].
Thus, the measurement of CTS among guitarists is important to help: eliminating long-term disability, encouraging ergonomics of the hand, screening at-risk people at an early stage, developing special physiotherapy programs, and improving the health and career life of musicians [18]. The proposed study is expected to assess prevalence rates of Carpal Tunnel Syndrome among professional guitarists as it will be used to provide the necessary epidemiological information to enhance clinical awareness, health education, and management of performance-related injuries in this creative field [14]. Through highlighting this concern, the study aids to the culture of a healthier and sustainable practice within the music society [19]

NEED OF STUDY

- These motions are particularly occurred when performed during a long time in practice or performance. It may result into inflammation and pressure on the median nerve Repetitive wrist and finger movements lead to the flexor tendon inflammation in the small tunnel of the carpel causing greater pressure and compression of the median nerve, causing CTS. CTS may severely reduce the playing and performance capabilities of professional guitarists, so it is a relevant issue in the music community.

Population And Sample

Sample Size: 110

Data And Sources Of Data

Study Design: Prevalence study
Study Type: Observational study
Study Settings: musicians

Theoretical Framework

The purpose of the current research was to evaluate the level and frequency of Carpal Tunnel Syndrome (CTS) in professional guitarists with the help of the Boston Carpal Tunnel Questionnaire (BCTQ). The results show that there is a significant incidence of CTS-related symptoms between the respondents. The majority of guitarists complained that they felt pain, numbness, or even tingling in the dominant hand, which is the one that is mostly used in the fretting or strumming. The constant flexion and movements of the wrists, as well as long practice hours put the carpal tunnel under continuous mechanical stress, which causes irritation and compression of the median nerve. These findings indicate that the monotonous, and manualistic attributes of playing the guitar is a major cause of strain in the wrist, as well as, disability in functions, particularly those requiring fine motor and load-bearing activities, in the dominant hand that does most of the fine motor-specific and load-bearing activities.

RESEARCH METHODOLOGY

1. Study Design - cross-sectional

2. Study Population- - Professional guitarists (who perform regularly and/or teach music professionally).

3. Sample Size- The study will target a sample size of approximately 110 guitarists. The sample will include individuals from various age groups, genders, and experience levels. A stratified sampling approach will be used to ensure adequate representation of professional guitarists.

Table 1: Distribution of study participants according to their age in years

Age Group(yrs)	No of study participants	Percentage
18-27 yrs	42	38.18
28-37 yrs	45	40.91
38-47 yrs	23	20.91
Total	110	100
Mean±SD	30.70±7.49(18-45 years)	

38.18% of study participants were in the age group of 18-27 years, 40.91% in 28-37 years and 20.91% of study participants were in the age group of 38-47 years.

Graph 1: Distribution of study participants according to their age in years

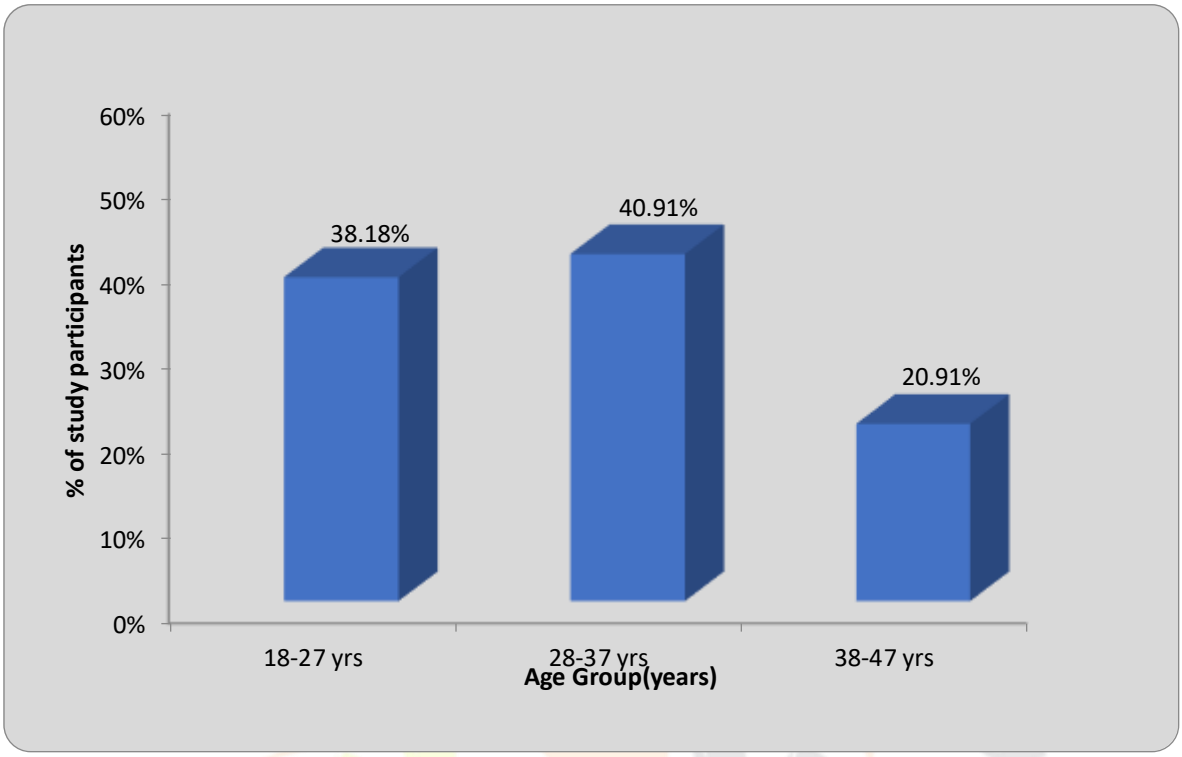


Table 2 : Distribution of study participants according to duration of playing

Duration of playing(yrs)	No of study participants	Percentage
1-5 yrs	24	21.82
6-10 yrs	36	32.73
11-15 yrs	28	25.45
16-20 yrs	22	20
Total	110	100
Mean±SD	10.42±4.93(3-20 years)	

21.82% of study participants had duration of playing 1-5 years, 32.73% had 6-10 years, 25.45% had 11-15 years and 20% of study participants had duration of playing of 16-20 years.

Graph 2: Distribution of study participants according to duration of playing

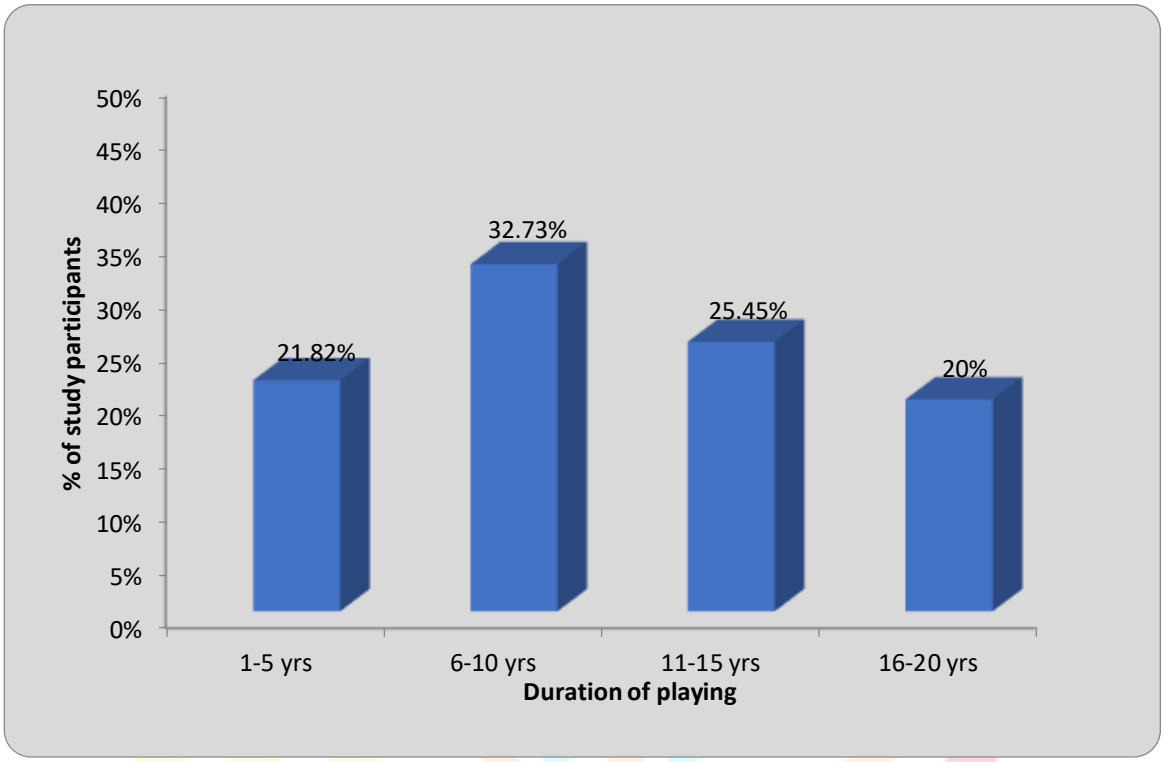


Table 3 : Distribution of study participants according to time of playing per day(hours)

Hours of playing	No of study participants	Percentage
1-2 hrs	14	12.73
2.1-3 hrs	27	24.55
3.1-4 hrs	27	24.55
4.1-5 hrs	20	18.18
5.1-6 hrs	22	20
Total	110	100
Mean±SD	10.42±4.93(3-20 hrs)	

12.73% of study participants had hours of playing 1-2 hours, 24.55% had 2.1-3 hours and 3.1-4 hours, 18.18% had 4.1-5 hours and 20% of study participants had 5.1-6 hours of playing.

Graph 3 : Distribution of study participants according to time of playing per day(hours)

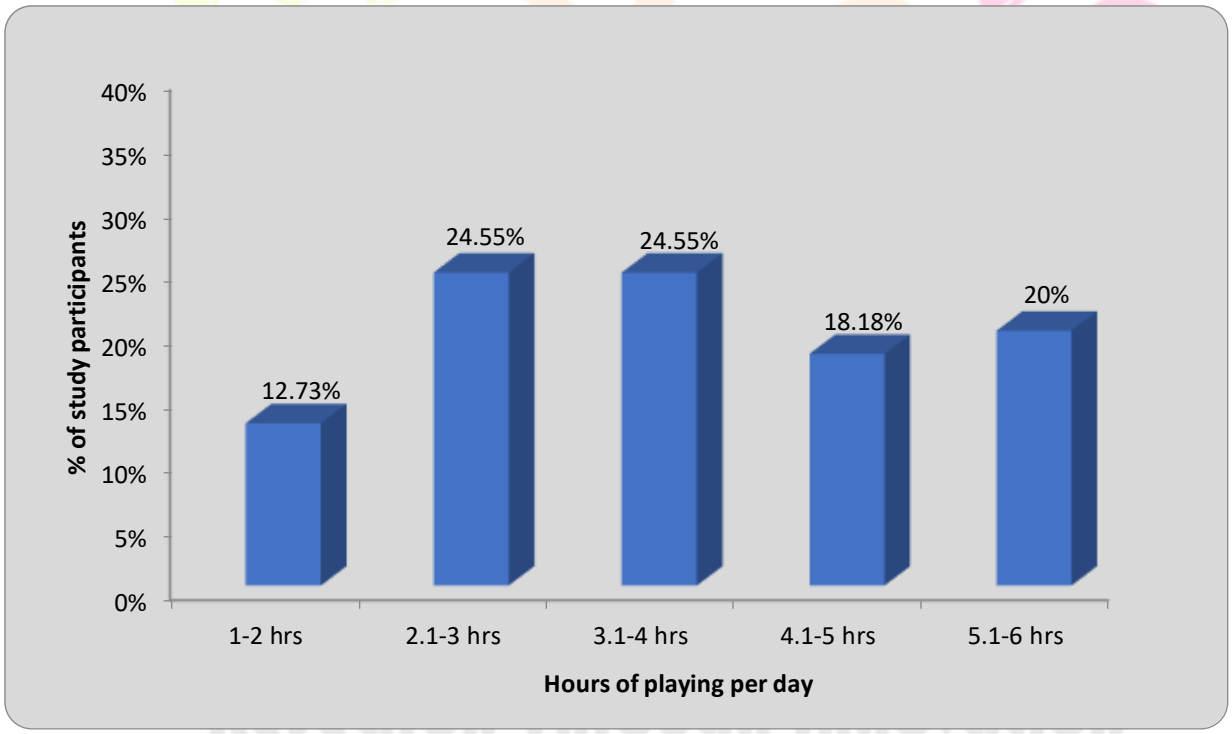


Table 4: Distribution of study participants according to Overall Severity

Overall Severity	No of study participants	Percentage
Normal/Mild	21	19.09
Moderate	22	20
Mild to Moderate	31	28.18
Severe	36	32.73
Total	110	100

19.09% of study participants had mild severity, 20% had moderate, 28.18% had mild to moderate and 32.73% of study participants had severe severity.

Graph 4 : Distribution of study participants according to Overall Severity

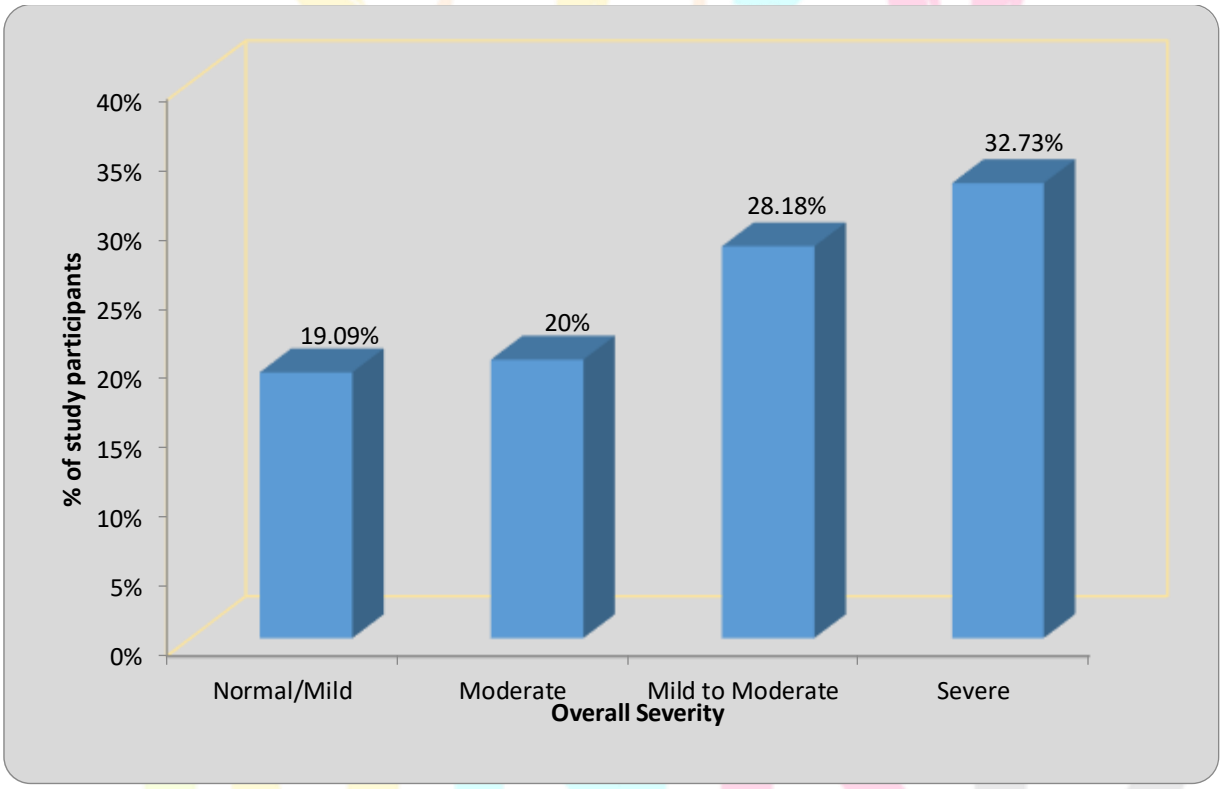
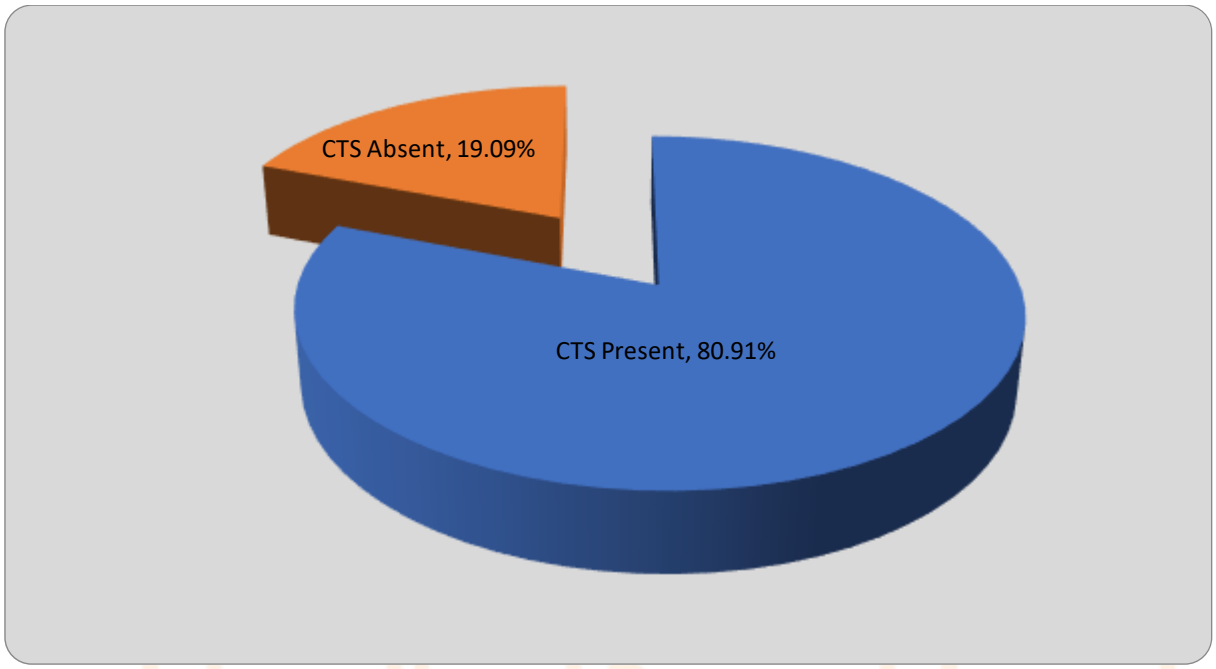


Table 5 : Distribution of study participants according to CTS results

CTS results	No of study participants	Percentage
CTS Present	89	80.91
CTS Absent	21	19.09
Total	110	100

CTS was present in 80.91% of study participants.

Graph 5 : Distribution of study participants according to CTS results



REFERENCES

1. Musicians Have Thicker Median Nerve Cross Sectional Area And More Symptoms Of Carpal Tunnel Than Non Musicians — Emily Pratt, Henning Vauth, Gary McIlvain, Mark K. Timmons. Medical Problems of Performing Artists, 35(3), 138-144, 2020.

2. Neural Tissue Tightness Of The Upper Extremities In Guitarists — Deepika Sathaye, Sona Kolke, Ashok Shyam, Parag Sancheti. Journal of Musculoskeletal Research, 23(02), 2050001, 2020.

3. Overuse Syndrome Of The Hand And Wrist In Musicians: A Systematic Review — Julia Betzl, Ursula Kraneburg, Kai Megerle. Journal of Hand Surgery (European Volume), 45(6), 636-642, 2020.

4. Getting Over Overuse Injuries: A Broad Review Of Interventions For Musicians And Carpal Tunnel Patients — Andrea Escoto, Shannon Keith. Azusa Pacific University, 2021.

5. Disability And Severity Of Playing Related Soft Tissue Injuries Among Professional Guitar Players: A Cross Sectional Survey — SD Shahanawaz, Tolgahan Acar, Vamsi Krishna Gannamaneni. European Journal of Molecular & Clinical Medicine, 7(02), 2020.

6. Carpal Tunnel Syndrome In Musicians: A Review — Chan YL, Silverstein BA. Hand Clinics, 2019.

7. Playing-Related Musculoskeletal Disorders In Guitarists — Kok LM et al. Medical Problems of Performing Artists, 2018.

8. Influence Of Guitar Playing Posture On Hand And Wrist Biomechanics — Fry H. Journal of Performing Arts Medicine, 2017.

9. Prevalence Of Upper Limb Disorders In Musicians — Zaza C. Occupational Medicine, 2017.

10. Ergonomic Risk Factors In Guitar Players — Mendes A et al. Journal of Bodywork & Movement Therapies, 2019.

11. Median Nerve Mobility And Nerve Gliding Techniques Effectiveness — Coppieters M. Manual Therapy, 2017.

12. Impact Of Wrist Flexion On Median Nerve Compression — Werner R. Journal of Orthopaedic Research, 2018.

13. Electrophysiological Abnormalities In Carpal Tunnel Syndrome — Kimura J. Clinical Neurophysiology, 2020.

14. Overuse Injuries In Musicians: Prevention Strategies — Ackermann B. BMJ Sports Medicine, 2020.

15. Tendon And Nerve Adaptations To Repetitive Strain — Barr AE, Barbe MF. Journal of Applied Physiology, 2018.

16. Validity of the Boston Carpal Tunnel Questionnaire — Levine DW et al. Journal of Bone & Joint Surgery, 1993.

17. Guitar Playing And Postural Deviations: A Kinematic Study — Silva AG. Applied Ergonomics, 2021.

18. Effectiveness Of Splinting In CTS Management — Page MJ. Cochrane Review, 2019.

19. Neuropathies Associated With Instrumental Performance — Lederman RJ. Hand Clinics, 2021.

20. Musculoskeletal Pain Patterns Among Guitarists: A Survey — Baadjou V. International Journal of Performance Health, 2019.

21. Boston Carpal Tunnel Questionnaire and Severity of Carpal Tunnel Syndrome Forcelini, Cassiano Mateus MD, Neuromuscular Disease 23(4):p 183-188, June 2022. | DOI: 10.1097/CND.0000000000000409