A STUDY TO DETERMINE THE PREVALENCE OF SIGNS AND SYMPTOMS OF CARPAL TUNNEL SYNDROME AND DE QUERVAINS TENOSYNOVITIS IN GARMENT WORKERS IN THE eTHEKWINI DISTRICT OF KWA-ZULU NATAL

SUBMITTED IN PART FULFILMENT FOR MASTERS DEGREE IN HAND REHABILITATION

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Author's Declaration

I, Miss Prabashni Pillay declare that 'A Study to Determine the Prevalence of Signs and Symptoms of Carpal Tunnel Syndrome and de Quervains Tenosynovitis in Garment Workers,' is my own work and that all sources that were used or quoted have been indicated by means of complete references. This study has not been submitted in any form to another university or institution.

_____ _____

Miss P. Pillay Date

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Glossary and List of Abbreviations

PREVALENCE: that which exists or is very common at a particular time or in a particular place.

INCIDENCE: the extent to which something happens or has an effect.

CARPAL TUNNEL SYNDROME: Nerve entrapment involving compression of the median nerve at the wrist causing sensory symptoms typically involving the thumb, index, middle and radial half of the ring finger.

De QUERVAINS TENOSYNOVITIS: Inflammation of the tendon sheath of the thumb attributed to excessive friction between the abductor pollicis longus and extensor pollicis brevis tendons and their common sheath, usually caused by twisting and forceful gripping motions with the hands.

MEDIAN NERVE: A major nerve of the hand that dominates the thumb, index and ring finger.

CARPAL TUNNEL: The osseofibrous passage for the median nerve and the flexor tendons, enclosed by the flexor retinaculum and carpal bones of the hand.

REPETITIVE STRAIN INJURIES (RSI's), CUMULATIVE TRAUMA DISORDER (CTD): Synonymous terms for disorders caused by prolonged, repetitive tasks.

MFL: Manitoba Federation of Labour

CM: centimetres

%: percent

UKZN: University of Kwa-Zulu Natal

OSHA: Occupational Safety and Health Administration

AAOS: American Academy of Orthopaedic Surgeons

ABSTRACT

Introduction: Garment work is repetitive and detailed and requires constant use of the hands. It is no surprise that garment workers are at high risk for developing repetitive strain injuries (RSI's) (MFL Occupational Health Centre, 1999). Work-related upper limb disorders, popularly known as RSI's, affect over 370,000 people in Great Britain with 86,000 new cases recorded in 2010. This costs employers almost £300 million in lost working time, sick pay and administration (The Chartered Society of Physiotherapy, 2007). There is however no statistics documented on RSI's among garment workers found for South Africa. *Aim:* To determine the prevalence of signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. *Method:* A study using quantitative data was used. A validated questionnaire consisting of open-ended and closed questions was utilized. Data was collected from two hundred subjects of varying age, gender and ethnic group. Information on signs and symptoms and possible risk factors of RSI's were obtained. The visual analogue scale was used to assess pain, a goniometer to measure active range of movement, the Phalens test, Reverse Phalens test and Finkelsteins test was used to assess the signs and symptoms of the two occupational repetitive strain disorders. *Data analysis:* All data was captured and analysed using the Statistical Package for Social Sciences (SPSS version 15). Descriptive statistics such as mean, standard deviation, proportions, median, mode and interquartile range was used to summarize the data. Pearson's Chi Square tests and Fishers Exact tests were used to test for association between two categorical variables. Independent Samples t-tests were used for the difference in age distribution between participants that presented with carpal tunnel syndrome and de Quervains tenosynovitis and of those who did not present with them. The level of significance was set at 0.05. Bar graphs, tables and pie charts were used to depict the results. *Results/Discussion:* The results of this study indicated that 59% of participants presented with signs and symptoms of de Quervains tenosynovitis and 63% of participants presented with signs and symptoms of carpal tunnel syndrome. The prevalence of carpal tunnel syndrome and de Quervains tenosynovitis was 42% and 43% respectively among garment workers in the eThekwini district. In addition, 100% of participants stated that they work under the following conditions, applying weight through the arms, repeated movement, work with their arms in unsupported positions, fast hand movements and holding or grasping for more than 2 hours continuously per day. Seventy two and a half percent of participants stated that their work entailed using vibratory tools for prolonged hours. Pearson's Chi Square tests

showed no association of use of vibratory tools to de Quervains tenosynovitis (P=0.666) or to carpal tunnel syndrome. This is inconsistent with the findings of the study completed by Leclerc et al. (1998) who stated that different dimensions of exposure to physical workload are widely recognised as risk factors. These risk factors include rapid hand motions, repetitive bending and twisting of the hands and the wrist, fast work pace, repetitive grasping with the fingers, mechanical stress at the base of the palm and the palm and the use of vibratory tools (Leclerc et al. 1998). *Conclusion:* This study has identified the prevalence of signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis among garment workers. It has also shown that a significant percentage of garment workers presented with symptoms of burning, tingling, itching and numbness in their hands as well as feelings of swollen and 'useless' hands. A significant number presented with functional limitations to certain activities of daily living suggestive of the presence of carpal tunnel syndrome. De Quervains tenosynovitis was indicated when a significant number of participants presented with pain, tenderness or swelling over the radial aspect of the wrist as well as functional limitations to certain activities of daily living.

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Chapter 1

Introduction

1.1. Background and rationale

Carpal tunnel syndrome is the most common nerve compression disorder of the upper extremity. It affects 1% of the general American population and 5% of the working population who are subjected to repetitive use of their hands and wrists in daily living (Concannon et al. 2000). According to Foye (2010), de Quervains tenosynovitis is a common condition of the hand characterized by a localized swelling at the base of the thumb and thickening of the fibrous sheath or retinaculum. De Quervains tenosynovitis is relatively prevalent especially among individuals who use their hands to perform repetitive activities. Following a thorough search there has been no statistics on the prevalence of carpal tunnel syndrome and de Quervains tenosynovitis in garment workers in South Africa therefore it has become evident that a gap exists for this country regarding these conditions and there is a necessity to obtain data regarding the prevalence of repetitive strain injuries to the hand.

The garment industry is a booming and vibrant industry in South Africa, with South Africa competing amongst various famous brand names. Due to increasing fashion trends many chain stores in South Africa import their garments from other countries. However, due to the great demand of clothing in South Africa, a large number of clothing stores distribute their garments to surrounding manufacturing companies. There are numerous garment manufacturing factories in the eThekwini District of Kwa-Zulu Natal. Large scale manufacturing garment factories have approximately one to two hundred garment workers and small scale factories consist of less than fifty garment workers.

The garment manufacturing industry in Kwa-Zulu Natal is known to be manned by the unskilled industry of the minimally educated or uneducated people. It is noted by many people as one of the most common industries to obtain employment as no experience or qualification is required. There is no training or medical screening offered to employees prior to employment. Most factories rely on a first aid kit if occupational injuries occur. According to recent anecdotal media coverage surrounding the garment industry in South Africa this statement is true as several factories no longer belong to the Bargaining Council, a union that offers support to the garment workers', as this trade is slowly becoming extinct due to the importing of garments from other countries. Factory owners are now subjected to rely on

minimal services in order to sustain their businesses. The work environment in the majority of manufacturing factories is unsafe and unhealthy (Parimalam et al. 2006), namely, poorly designed workstations, unsuitable furniture, lack of ventilation, inappropriate lighting, excessive noise, insufficient protection from dangerous chemicals, insufficient safety measures in fire emergencies and lack of personal protective equipment. Employees working in such a poor or substandard environment are more prone to occupational injuries (Parimalam et al. 2006).

Are the garment workers in South Africa at risk of developing upper extremity repetitive strain injuries? Are they able to identify early signs and symptoms of repetitive strain injuries and seek help?

Repetitive strain injuries (RSI) are defined as cumulative trauma disorders resulting from prolonged repetitive, forceful or inappropriate movements of the hands. These movements result in damage to muscles, tendons and nerves (Nainzadeh et al. 1999). Occupational repetitive strain injury is becoming a worldwide concern and it is especially serious when it affects our economy. The Chartered Society of Physiotherapy (2007) stated that there were 86 000 new cases of work related upper limb disorders recorded in 2006 in Great Britain. This cost employers in Great Britain £300 million in lost working time, sick pay and administration. A plan obviously needs to be formulated before the effects of these hand conditions become irreversible.

Occupation-related injuries to the upper limb are increasing daily throughout the world (Leung et al. 2000).Hong Kong, like other cities, has reported a high incidence of occupational hand injury. It was noted that in one month in a 1500 bed hospital, 50% of the injuries were industrial injuries to the hand (Leung et al. 2000). Many of these disorders are suspected of being caused by physical work activities, for example, jobs that involve repetitive movements, heavy physical work and awkward postures (Palmer et al. 2009). Furthermore, according to the Occupational Safety and Health Administration (OSHA), poor ergonomics in the workplace is also known to be a causative factor of these injuries (Occupational Safety and Health Administration, 2000). The Occupational Safety and Health Administration is an organization that is a division of the United States Department of Labour. The Occupational Safety and Health Administration's administrator is answerable to the Secretary of Labour who is a member of the cabinet of the President of the United States of America. The function of the Occupational Safety and Health Administration is to ensure

safe and healthy working conditions for working citizens by establishing and implementing standards and by providing training, outreach, education and assistance.

Parimalam et al. (2006) stated that the work environment in the garment manufacturing units in Madurai City is unhealthy and unsafe for the workers, resulting in several health problems. Ergonomic interventions have been suggested which will eventually help to improve the work environment and also to overcome the health problems (Parimalam et al. 2006). This gives researchers an insight that a problem exists and further research needs to be conducted in order to assist garment workers with possible solutions to promote good health. According to Ranney et al. (1995), following a physical assessment of the 146 female employees in highly repetitive job industries, 54% were found to have musculoskeletal disorders of the upper limb. Carpal tunnel syndrome was the most common form of neuritis with 16 people affected, 7 of whom presented bilaterally with the condition. De Quervains tenosynovitis and wrist flexor tendinitis were the most commonly found disorders in the distal forearm.

A thorough literature search on repetitive strain injuries in South Africa has revealed that there have been no studies on the prevalence of repetitive strain injuries, namely, carpal tunnel syndrome and de Quervains tenosynovitis among garment workers and the possible risk factors associated with it. The choice of conditions for this study was selected as minimum studies and no statistics were obtained on carpal tunnel syndrome and de Quervains tenosynovitis among garment workers in South Africa. Garment production involves the performance of monotonous, highly repetitive and high speed tasks often requiring non-neutral and awkward postures. These exposures place garment workers at risk of work-related musculoskeletal disorders (Herbert and Plattus, 2010). The most common repetitive strain injuries are carpal tunnel syndrome, de Quervains tenosynovitis, epicondylitis and rotator cuff tendinitis. These upper extremity conditions can be clinically diagnosed using specific tests and identifying symptoms thereof (O'Neil et al. 2001).

1.2. Aims

The aim of this study was to determine the prevalence of signs and symptoms of two common occupational repetitive strain disorders of the hand in garment workers, namely, carpal tunnel syndrome and de Quervains tenosynovitis.

1.3. Objectives

The objectives of this study are:

1. To compare the prevalence of signs and symptoms of carpal tunnel syndrome to that of de Quervains tenosynovitis.

2. To determine if subjects' present with typical signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis.

3. To identify possible external risk factors for carpal tunnel syndrome and de Quervains tenosynovitis.

4. To determine whether garment workers present with any functional limitations when performing specific activities of daily living.

1.4. Significance

This study will provide researchers, industrial workers, garment workers and employers with insight into the proportion of clothing workers' presenting with signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. The study was intended to bring about awareness amongst garment workers about overuse injuries. It has also reflected the need for intervention with regards to workplace modifications and treatment of the conditions in order to promote a safe, pain free, healthy and productive working environment.

Chapter 2

Literature Review

2.1. Introduction

Cumulative trauma disorders due to performance of repetitive tasks account for more than fifty percent of all occupational illnesses in the United States today (Rempel et al. 1992). These repetitive movements result in damage to the muscles, tendons and nerves. Repetitive strain injuries are also referred to as repetitive stress injuries, repetitive motion disorders and occupational overuse injuries. They may be referred to as well-defined disorders such as carpal tunnel syndrome (CTS) and tendinitis (Nainzadeh et al. 1999).

A variety of primary and secondary sources (textbooks and journal articles) was consulted. The literature search was dated from 1980 - 2010. Google Scholar, UKZN Online Libraries, Science Direct, PubMed, and Medline online databases were searched using the following keywords: repetitive strain injuries, hand inflammatory conditions, overuse injuries in the workplace, carpal tunnel syndrome and de Quervains tenosynovitis.

2.2. Prevalence of repetitive strain injuries

Table 1 below illustrates the estimated prevalence and rates (%) in Britain of self-reported musculoskeletal disorders mainly affecting the upper limbs or neck caused or made worse by current or most recent jobs for people working in the last 12 months (The Chartered Society of Physiotherapy, 2007).

Table 1: Prevalence of musculoskeletal disorders in selected occupations in Britain (The Chartered Society of Physiotherapy, 2007)

Occupation description	Rate per 100 employed in the last 12 months (%)	Prevalence
Process, plant and machine operatives	1.1	24,000
Skilled trades occupations	0.91	30,000

Associate professional and technical occupations	0.76	30,000
Personal service occupations	0.76	17,000
Sales and customer service occupations	0.50	12,000
Administrative and secretarial occupations	0.48	18,000
Elementary occupations	0.45	16,000
Managers and senior officials	0.36	15,000
Professional occupations	0.32	11,000
All occupations	0.60	173,000

The annual prevalence in Britain is the estimated number of people with a work-related illness at any time during the 12-month period. It includes the full range of illnesses from long standing to new cases. The rate is the prevalence estimate divided by the population at risk of having a work-related illness. The Health and Safety Executive (HSE) in Britain reports that for the major occupational groups where the sample numbers were large enough to provide reliable estimates, process, plant and machine operatives and skilled trade occupations carried rates which were statistically significantly higher than the overall rate 0.60% (The Chartered Society of Physiotherapy, 2007). Occupational groups with statistically significantly higher rates were: health and social welfare associate professionals; process, plant and machine operatives and skilled construction and building trades. Occupational groups with statistically significant lower rates were professional occupations, managers and senior officials (The Chartered Society of Physiotherapy, 2007).

The United States Bureau of Labour Statistics estimates that more than 332 000 cases of disorders were caused by repeated trauma in 1994. From 1984-1994, the incidence rate increased from 5.1 to 39 cases per 10 000 full time workers. In the workplace, upper extremity repetitive strain injury (RSI) does outnumber lower extremity injuries. In 1989, the total United States Workers' Compensation costs for upper extremity cumulative trauma

injuries which is a disorder caused by prolonged, repetitive tasks was estimated to be 563 million dollars. Workers considered at high risk for repetitive strain injuries include garment workers, construction workers, meat processors and grocery checkers (Nainzadeh et al. 1999). Following a thorough search for prevalence of repetitive strain injury amongst garment workers in South Africa, it has been established that there has been no studies conducted regarding this area.

2.3. Causative factors of repetitive strain injuries

Repetitive strain injury (RSI) affects a large percentage of the workforce. People develop repetitive strain injuries because they do not know how to or are unable to protect their muscles, nerves and tendons. The workstation may not be set up properly; they may have never been trained to use their hands correctly, or they may be unable to pace themselves (Nainzadeh et al. 1999). The epidemiological literature indicates that the greater the level of exposure to a single risk factor or combination of factors leads to a greater the risk of having a work related musculoskeletal disorder. The literature by the Occupational Safety and Health Administration also indicates that an important factor is the time between each episode of exposure. With adequate time to recover or adapt, and particularly when lower forces are involved, there may be less harm to the body from repeated exposures. The intensity as well as the extended length of the exposure to forceful, repetitive work plays a substantial role in the risk of work related musculoskeletal disorders in many traditional occupational settings (Occupational Safety and Health Administration, 2000).

In workplaces with high rates of work-related musculoskeletal disorders there is little scientific evidence that the principal reason for the excess number of injuries or illnesses is a result of the workers' psychological reaction to their workplace. However, there is evidence particularly in office settings, suggesting that both physical and psychosocial factors may be important contributors to musculoskeletal disorders (Occupational Safety and Health Administration, 2000). Repetitive strain disorders related to an employee's occupation occur when the physical capabilities of the employee do not complement the physical requirements of the job. Prolonged exposure to ergonomic risk factors can lead to musculoskeletal disorders (Occupational Safety and Health Administration, 2000).

Conditions that are likely to cause musculoskeletal problems include the following:

- Exerting excessive force in repetition on joints and structures can eventually cause wear and tear of the joints and structures involved thereby causing pain, muscle spasm and inflammation to surrounding structures which will lead to decrease in range of motion of joints and hinder daily activities;

- Excessive repetition of movements can increase blood flow to the area for example, the hands, and cause inflammation thus resulting in tendonitis which could lead to compression of nerves;

- Inappropriate postures, or unsupported positions for prolonged periods can cause compression of nerves, adopting poor postures thus causing musculoskeletal problems;

- Static postures, or positions that an employee must maintain for long periods of time during working hours, can restrict blood flow to other areas of the body thereby causing damage to muscle. These muscles will be restricted of blood flow as well as oxygen for muscles and organs as well as nerves and other structures to function adequately;

- Motion, such as increased speed or acceleration when bending or twisting, can increase the amount of force exerted on the body thus causing strain to muscles which can lead to an inflammatory process;

- Compression of structures in the hand, from grasping sharp edges like tool handles, can concentrate force on the joints of the hand, reduce blood flow and nerve transmission, and damage tendons and tendon sheaths;

- Inadequate recovery time due to overtime, lack of breaks, and failure to vary tasks may leave insufficient time for tissue repair. Tissues need sufficient time to recover from the constant stresses of work practices and can therefore be damaged if healing is delayed or incomplete;

- Excessive vibration, usually from vibrating tools, can decrease blood flow, cause compression of nerves, and contribute to muscle fatigue. Muscle fatigue is due to firm, constant grasping of these tools which are continuously vibrating causing the involved muscles and surrounding structures to be in motion.

- Working in cold temperatures can adversely affect a worker's co-ordination and manual dexterity and cause a worker to use more force than necessary to perform a task. Cold impairs the performance of complex mental tasks. Manual tasks are also impaired because the sensitivity and dexterity of fingers are reduced in the cold. At even lower temperatures, the cold affects the deeper muscles resulting in reduced muscular strength and stiff joints.

These risk factors, either alone or in combination are likely to subject employees to numerous repetitive twisting, forceful, or flexing motions during a typical workday. To contribute to musculoskeletal disorders these risk factors must be present for a sufficient duration, frequency or magnitude (Occupational Safety and Health Administration, 2000).

2.4. Carpal tunnel syndrome

2.4.1. Definition

Carpal tunnel syndrome is defined as compression of the median nerve as it passes through the carpal tunnel in the wrist (Beers and Berkow, 1999). The carpal tunnel is a space located posterior between the carpal bones of the wrist (from left to right: trapezium, trapezoid, capitates and hamate), forming the hard 'carpal floor' and anterior where the transverse ligament forms a fibrous sheath or the 'carpal roof'. The tunnel is filled with the flexor tendons of the hand and the median nerve. The median nerve originates from numerous spinal nerves from C5 to T1. It has both sensory and motor functions of the thumb, first, second and lateral aspect of the third digits. Consequently, it is vital for not only grip but also for sensory inputs related to hand function (Scanlon and Maffei, 2009).

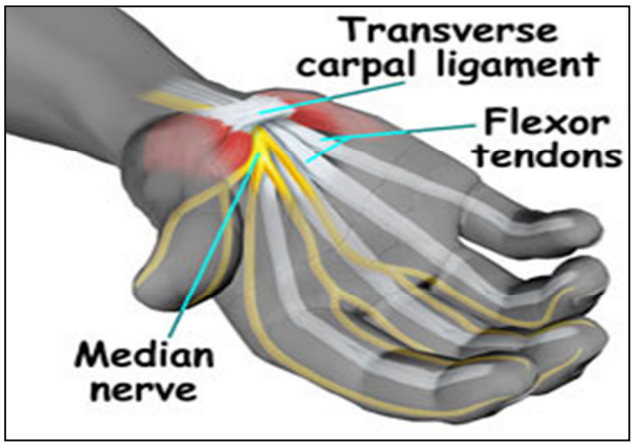

Figure 1.Compression of the median nerve (Bartholet, 2001)

2.4.2. Signs and symptoms

Symptoms usually start gradually, with frequent burning, tingling, itching and numbness in the palm of the hand, thumb, first, second and lateral aspect of the third digits, especially the thumb and the index and middle fingers. Some carpal tunnel subjects state that their fingers feel "useless and swollen", even though little or no swelling is apparent. The affected individual usually first experiences sensory changes associated with carpal tunnel syndrome at night. A person with carpal tunnel syndrome may wake up feeling the need to "shake out" the hand or wrist. As symptoms worsen, people might feel tingling during the day (National Institute of Health, 2002). Decreased muscle strength in the hand is a late sign and is common for those with moderate to severe carpal tunnel syndrome. Weakness in the hand may make it

difficult to form a fist, grasp small objects, or perform other manual tasks. In chronic and/or untreated cases, the muscles of the thenar eminence may waste away (Scanlon and Maffei, 2009).

2.4.3. Prevalence

Women are three times more likely than men to develop carpal tunnel syndrome, perhaps because the carpal tunnel itself may be smaller in women than in men (National Institute of Health, 2002). The dominant hand is usually affected first and produces the most pain. Persons with diabetes mellitus or other metabolic disorders that directly affect the body's nerves and make them more susceptible to compression are also at high risk (National Institute of Health, 2002). Neuropathies are the most common complication of diabetes mellitus affecting up to 50% with type 1 and 2 diabetes mellitus (Lin et al. 2011). The diabetes association is due to the fact that when blood glucose levels are elevated, the proteins in the tendons of the carpal tunnel become glycosylated; that is, glucose attaches to the tendon proteins, inflaming them and forming an organic adhesive that makes the tendons less capable to slide without restraint. If one is susceptible to carpal tunnel syndrome because of diabetes or other conditions, the condition may be brought out or exacerbated by repeated forceful flexing of the hands and wrists (Wartburg, 2007).

The risk of developing carpal tunnel syndrome is not confined to people in a single industry or job, but is especially common in those performing assembly line works - manufacturing, sewing, cleaning, and meat, poultry, or fish packaging (National Institute of Health, 2002). During 1998, an estimated three of every 10,000 workers in the United States lost time from work because of carpal tunnel syndrome. Half of these workers missed more than 10 days of work. The average lifetime cost of carpal tunnel syndrome, including medical bills and lost time from work, is estimated to be about $30,000 for each injured worker (National Institute of Health, 2002).

2.4.4. Diagnosis

Early diagnosis and treatment are important to avoid permanent damage to the median nerve (Tuen, 2007). A clinical assessment is separated into a history and physical examination. During the history examination carpal tunnel syndrome patients' often describe diffuse, poorly localized aching that can involve the entire hand and forearm. Many patients report that the hand "falls asleep" with the exception of the little finger. Some patients also describe

weakness, clumsiness, dry skin, coldness, swelling and or changes in the hand. Symptoms are more common during activities requiring the wrist to adopt a flexion or extension posture and discomfort is aggravated by driving, holding a phone, book or a newspaper. Patients often note that symptoms are relieved partially by changes in the hand posture or 'shaking the hand' (Tuen, 2007). During the physical examination, provocative tests such as the Tinel sign where paresthesias are provoked by tapping over the median nerve at the wrist, Phalen maneuver where while holding the wrist flexed, paresthesia occurs within 1-2 minutes and direct compression tests are useful. During the motor examination the hand is inspected and examined for muscle atrophy (Tuen, 2007). Dry skin may be visible on digits 1, 2 and 3. The strength of thumb abduction and opposition is tested. Two-point discrimination may be affected before pain and temperature sensation. Even in severe cases of carpal tunnel syndrome, sensation over the thenar area usually is spared, as it is innervated by the palmar cutaneous sensory branch (a median nerve branch that arises proximal to it but does not pass through the carpal tunnel) (Tuen, 2007).

Pain in the hand and wrist is often the main reason patients seek help for their condition. It is often the most difficult symptom to describe and is known to many as subjective during assessment. Cork et al. (2004) stated that the visual analogue scale is a common tool used to measure pain. A survey was performed to determine if the simple Verbal Rating Scale (VRS) could be substituted for the Visual Analogue Scale (VAS) to measure pain intensity in chronic pain patients. Eighty-five (85) chronic pain patients were surveyed using both VAS and VRS. Pearson correlation coefficient($r = 0.906$) and p value (< 0.0001) showed excellent correlation between the two and thus the VRS can be used as an alternative. Bijur et al. (2001) stated that the reliability of the visual analogue scale used to assess pain needed to be researched. A convenience sample of adults presenting with acute pain were selected. Reliability of the visual analogue scale for acute pain measurement as assessed by intraclass correlation coefficients appeared to be high. Ninety percent of the pain ratings were reproducible within a short period of time. This data suggests that the visual analogue scale is a sufficiently reliable tool that can be used to measure pain.

The purpose of sensation tests is to detect sensory impairment, determine which sensation is affected and determine the severity of the impairment (Lundy-Ekman, 1998). Tomberlin and Saunders (2001) stated that the neurological examination is an important part of a clinician's objective examination. The neurological part of the neuromusculoskeletal evaluation consists of a series of tests such as light touch testing, tactile thresholds (Semmes Weinstein

Monofilament), two-point discrimination, bilateral simultaneous touch and sensation to temperature to determine if the patient's problem is caused by spinal nerve root involvement, peripheral nerve pathology or a central nervous system lesion (Lundy-Ekman, 1998).

It was stated by Tomberlin and Saunders (2001) that a neurological examination should be carried out during the initial evaluation for any patient who describes the following symptoms:

- Pain following a nerve path
- Numbness (loss of sensation)
- Paresthesia (abnormal sensation)
- Weakness (decrease or loss of muscle function)

Byl et al. (1996) stated that repetitive strain injuries are reaching epidemic levels among workers who perform heavy schedules of rapid alternating movements. The purpose of the study was to determine if patients with repetitive strain injury demonstrated degraded sensory motor performance with their hands. It was suggested that when treating patients with repetitive strain injury, discriminative sensory motor skills must be carefully assessed and may need to be addressed as part of an effective treatment program.

A dermatome refers to the area of the skin innervated by the sensory axons within each segmental nerve (Trombly and Radomski, 2001). Cutaneous nerve fields are the areas of skin innervated by peripheral nerves. Light touch sensation is tested manually by descending along the skin with an object such as a cotton ball. The patient should be asked to report if the sensation from the cotton ball is similar bilaterally. The examination should be done with the patient's eyes closed and differences should be noted when comparing one limb to the other. The testing should be done according to dermatomes from the proximal part of the limb to the distal part. These findings can be used as the basis for reassessment on follow up examination and may help determine if the condition is worsening or improving (Tomberlin and Saunders, 2001).

The range of motion examination consists of active, passive and accessory movement tests. Active and passive motions are types of physiological movement. Physiological motion is movement in standard planes. Accessory movement is the small movement within the joints

and surrounding tissues that is necessary for normal physiological movements. The range of motion examination helps determine the extent to which they are involved. When performing any movement test – active, passive or accessory – the clinician should ask two main questions:

a. What is the effect of the test on the patient's symptoms?

b. Is the amount of movement normal, hypomobile or hypermobile?

The findings of the range of motion examination are significant if the amount of movement assessed is abnormal when compared to normal values of range of movement as seen in Table 2 below (Tomberlin and Saunders, 2001).

Active motion provides general information about the patient's functional ability. This includes the patient's willingness and ability to move the joint. Active movement assesses function and movements in functional patterns rather than straight planar motion yields more information. During active movement testing, the range of motion obtained when the patient is asked to perform a movement should be documented. The quality of movement and symptoms associated with movement should also be noted (Tomberlin and Saunders, 2001).

Passive movement tests differentiate contractile and non-contractile structures. These tests determine if the joint range is restricted, excessive or normal. If the passive movement is greater than the active movement, this indicates that the contractile tissue is at least partly responsible for the patient's symptoms. If active movement is greater than passive movement, the patient is unable to relax enough to let the clinician complete the testing (Tomberlin and Saunders, 2001).

Table 2: Normal values for measurement of range of motion of the wrist and thumb (Trombly and Radomski, 2001)

MOVEMENTS	NORMAL VALUES IN DEGREES (°)
WRIST: FLEXION	0-80
EXTENSION	0-70
RADIAL DEVIATION	0-20
ULNA DEVIATION	0-30
THUMB: METARCARPAL PHALANGEAL JOINT: FLEXION	0-50
EXTENSION	50-0
ABDUCTION	0-50
ADDUCTION	0-40
OPPOSITION IN CENTIMETERS (RULER)	NO NORM
INTERPHALANGEAL JOINT: FLEXION	0-90
EXTENSION	90-0
DIGITS 2,3,4: METARCARPAL PHALANGEAL JOINT:	
FLEXION	0-90
ABDUCTION	NO NORM
ADDUCTION	NO NORM
PROXIMAL INTERPHALNGEAL JOINT:	
FLEXION –EXTENSION	0-100
DISTAL INTERPHALNGEAL JOINT:	
FLEXION-EXTENSION	0-90

2.4.4.1. The Goniometer for measurement of range of motion

Trombly and Radomski (2001) stated that a goniometer is used to asses joint motion. In order to ensure reliability, the therapist must place the axis and arms appropriately. In addition to goniometer placement, for the most reliable and accurate results, every effort should be made to make the patient physically and emotionally comfortable by talking to the patient and describing the procedure that is to follow. For the most reliable pretest-posttest information, the same tester should use the same goniometer at the same time of day (Trombly and Radomski, 2001). The method of recording and measuring joint range of motion has followed

the procedures published by the American Academy of Orthopaedic Surgeons. This method is easily understood by most clinicians ensuring the greatest face and content validity (Lehman and Abreu, 1989).

2.4.4.2. The Dynamometer for measurement of grip strength of the hand

The hand held dynamometer is a common tool used to assess power grip in the hand (Tomberlin and Saunders, 2001). Barnes (2007) stated that grip strength is often used clinically as an indicator of hand function and as a quick and effective outcome measure for rehabilitation. In a study by Molenaar et al. (2008), the reliability of the Lode Dynamometer and the Martin vigorimeter was determined. It was found that both the Lode dynamometer and the Martin vigorimeterare reliable instruments with which to measure the grip strength. The Lode Dynamometer also had a better test retest reliability (Molenaar et al. 2001). Bellace et al. (2001) conducted a study to evaluate the reliability and validity of the Jamar dynamometer. It was found established that the Jamar dynamometer was found to be highly reliable and valid for measuring hand grip strength.

2.4.4.3. Specifics tests to reproduce carpal tunnel symptoms

Physicians use specific tests to try to reproduce the symptoms of carpal tunnel syndrome. In the Tinel test, the clinician taps lightly over the site of the median nerve at the distal wrist crease. Development of tingling or discomfort in the fingers supplied by the median nerve constitutes a positive sign (Aroori and Spence, 2007). Phalen and Kendrick described the Phalens test in 1957. Flexion of the wrist causes compression of the nerve between the transverse carpal ligament and the flexor tendons in the carpal tunnel, causing paresthesia in the median nerve distribution reproducing the patients' symptoms. The Phalens or wrist-flexion test involves having the patient hold his or her forearms upright by pointing the fingers down and pressing the backs of the hands together. The presence of carpal tunnel syndrome is suggested if one or more symptoms, such as tingling or increasing numbness, are felt in the fingers within 1 minute. (Aroori and Spence, 2007).

2.4.4.4. Electro-diagnostic tests

Electro-diagnostic study is a useful adjunct to clinical assessment but does not supplant the necessity for a thorough history and physical examination (Brotzman and Wilk, 1999). Nerve conduction studies measure the sensory and motor transmission velocity in the median nerve at the level of the wrist. The sensory component of the median nerve is affected much earlier

than the motor component and in early stages of carpal tunnel syndrome there is usually a delay in the sensory nerve conduction velocity. Sensory nerve conduction delay is determined by placing an electrode near the base of the ring finger following which the median nerve is stimulated 13cm proximal to the recording of the electrode. The antidromic sensory potentials are recorded and measured. The motor nerve conduction velocity from elbow to wrist is measured using surface electrodes (Aroori and Spence, 2007). In electromyography, a fine needle is inserted into a muscle; the results of the electrical activity are viewed on a screen which determines the severity of damage to the median nerve. Ultrasound imaging can show impaired movement of the median nerve. Magnetic resonance imaging (MRI) can show the anatomy of the wrist but to date has not been especially useful in diagnosing carpal tunnel syndrome (National Institute of Health, 2002).

2.4.5. Management

Treatments for carpal tunnel syndrome should begin as early as possible and managed in conjunction with a multidisciplinary team under a doctor's direction. It is imperative that physiotherapists (even though they are considered first line practitioners and are trained to diagnose and manage these hand conditions) are provided with sufficient information of the severity of the condition as well as the plan of treatment offered by the doctor. The examination including tests performed by the doctor will assist the therapist in devising an effective treatment plan including taking proper precautions not to exacerbate the symptoms. According to the National Institute of Health (2002), underlying causes such as diabetes or arthritis should be medically treated first. Initial treatment generally involves resting the affected hand and wrist for at least 2 weeks, avoiding activities that may worsen symptoms, and immobilizing the wrist in a splint to avoid further damage from twisting or bending. If there is inflammation, applying cool packs can help reduce swelling (National Institute of Health, 2002).

2.4.5.1. Non-operative treatments

These may include:

- The use of a splint, placing the wrist in a neutral position, worn at night. The splint can be worn during the day if the patient’s job allows for it (Brotzman and Wilk, 1999).

- The ability to modify activities for example, discontinuing the use of vibratory tools or placing a support under unsupported arms when sitting in front of the computer (Brotzman and Wilk, 1999).

- A cortisone injection into the carpal tunnel but not into the median nerve. Brotzman and Wilk (1999) stated that studies have shown that less than 25% of patients who took a cortisone injection in to the carpal tunnel became symptom free 18 months following the injection. It was also stated that 80% of patients had temporary relief with cortisone injection and splinting.

- Non-steroidal anti-inflammatory drugs (NSAID's) can be used to control inflammation (Brotzman and Wilk, 1999).

- Any underlying systemic disease such as diabetes, rheumatoid arthritis or hypothyroidism must be controlled (Brotzman and Wilk, 1999).

2.4.5.2. Surgery

Indications for surgical treatment of carpal tunnel syndrome include: thenar atrophy or weakness, loss of sensation, fibrillation potentials on electro-myelograms and if symptoms persist for more than a year regardless of appropriate conservative measures. The goals of carpal tunnel release are decompression of the median nerve, improvement of excursion and prevention of progressive nerve damage (Brotzman and Wilk, 1999). Surgery consists of division of the transverse carpal ligament. This reduces the pressure on the median nerve by increasing the space in the carpal tunnel. Two types of surgical approaches are used for the treatment of carpal tunnel syndrome; open and endoscopic release. Open carpal tunnel release is the traditional option and still the recommended method of surgical treatment for carpal tunnel syndrome. It was first performed by Herbert Galloway in 1924. The conventional open release carpal tunnel syndrome uses a curved longitudinal inter-thenar incision, approximately 4-5cm in length. It involves opening the subcutaneous tissue, superficial fascia and transverse carpal ligament and 2-3cm of distal forearm fascia under direct vision (Aroori and Spence, 2007).

Endoscopic surgery may allow faster functional recovery and less postoperative discomfort than traditional open release surgery. The surgeon makes two incisions (about 1.25 cm each) in the wrist and palm, inserts a camera attached to a tube, observes the tissue on a screen, and

severs the carpal ligament. This two-portal endoscopic surgery, generally performed under local anesthesia, is effective and minimizes scarring and scar tenderness. One-portal endoscopic surgery for carpal tunnel syndrome is also available (National Institute of Health, 2002).

Although symptoms may be relieved immediately after surgery, full recovery from carpal tunnel surgery can take months. Some patients may have infection, nerve damage, stiffness, and pain at the scar. Occasionally the wrist loses strength because the carpal ligament is cut. Patients should undergo physiotherapy after surgery to restore wrist strength. Some patients may need to adjust job duties or even change jobs after recovery from surgery. Recurrence of carpal tunnel syndrome following treatment is rare. The majority of patients recover completely (National Institute of Health, 2002).

2.4.6. Prevention of carpal tunnel syndrome

Protecting employees from occupational cumulative trauma disorders like carpal tunnel syndrome poses two challenges: identifying work-related risk factors and instituting appropriate modifications of workstations, tools, work organization and tasks. Ergonomics is rapidly advancing the ability to meet these demands. With training in anatomy, physiology, engineering, psychology and biomechanics, ergonomists are specialists in evaluating work tasks and sites and designing more efficient and safer work environments. Once high risk activities have been identified, ergonomic principles may be used to develop modifications to reduce or eliminate carpal tunnel syndrome (Rempel et al. 1992). The United States Occupational Health and Safety Administration have recently developed guidelines to prevent and reduce work-related cumulative trauma disorders. These guidelines recommend that employees involved in manual handling should minimize the distance between the load and the body, lift loads from knuckle height, keep the travel distance for the lift to less than 10 feet, minimizing twisting and ensuring good handles for grasping tools (Occupational Health and Safety Administration, 2000).

2.4.7. Alternative research related to carpal tunnel syndrome

The National Institute of Neurological Disorders and Stroke (NINDS) stated that scientists are studying the chronology of events that occur with carpal tunnel syndrome in order to better understand, treat and prevent this ailment. By determining distinct biomechanical factors related to pain, such as specific joint angles, motions, force, and progression over

time, researchers are finding new ways to limit or prevent carpal tunnel syndrome in the workplace and decrease other costly and disabling occupational illnesses (National Institute of Health, 2002).

Randomized clinical trials in the United States are being designed to evaluate the effectiveness of educational interventions in reducing the incidence of carpal tunnel syndrome and upper extremity cumulative trauma disorders. Data is to be collected from a National Institute for Occupational Safety and Health-sponsored study of carpal tunnel syndrome among construction workers will provide a better understanding of the specific work factors associated with the disorder, furnish pilot data for planning future projects to study its natural history, and assist in developing strategies to prevent its occurrence among construction and other workers. Additional research may discern differences between the relatively new carpal compression test (in which the examiner applies moderate pressure with both thumbs directly on the carpal tunnel and underlying median nerve, at the transverse carpal ligament) and the pressure provocative test (in which a cuff placed at the anterior aspect of the carpal tunnel is inflated, followed by direct pressure on the median nerve) in predicting carpal tunnel syndrome. The use of alternative therapies, such as acupuncture, to prevent and treat this disorder is also being investigated (National Institute of Health, 2002).

Palmer et al. (2006) conducted a systematic literature review on carpal tunnel syndrome and its relation to occupation. The objective of the study was to assess occupational risk factors for carpal tunnel syndrome. This was accomplished by identifying relevant primary research from two major reviews in the 1900's and supplemented this material by a systematic search of the Medline and Embase biomedical databases from the start of the electronic record to 1 January 2005. Reports were obtained and their bibliographies checked for other relevant publications. From each paper, a standardized set of information on study populations, exposure contrasts and estimates of effects were abstracted. Altogether, thirty eight primary reports were summarized, with analysis based either on a comparison of job titles or of physical activities in the job or both. It was found that regular and prolonged use of hand-held vibratory tools increases the risk of carpal tunnel syndrome two-fold. The balance of evidence on keyboard and computer work did not indicate an important association with carpal tunnel syndrome. Although the papers that were considered had limitations, a substantial and coherent body of evidence supports preventative policies aimed at avoiding highly repetitive wrist-hand work. Limitations mentioned involved potential information bias, limiting their statistical power may not fully have been controlled for confounding and the

possibility that investigations were prompted by the observation of workplace clusters which could have led to unrepresentatively high risk estimates (Palmer et al. 2006).

2.5. De Quervains tenosynovitis

2.5.1. Definition

De Quervains tenosynovitis is defined as stenosing tenosynovitis of the short extensor muscle (extensor pollicis brevis) and the long abductor tendon (abductor pollicis longus) of the thumb (Beers and Berkow, 1999).

2.5.2. Anatomy

The first dorsal compartment at the wrist includes the tendons of the abductor pollicis longus and the extensor pollicis brevis. Patients with this condition usually report pain at the dorsolateral aspect of the wrist with referral of pain toward the thumb and or the lateral forearm. Inflammation of a tenosynovium is called tenosynovitis. In the case of de Quervains tenosynovitis, the inflammation causes an impingement of the tendons in the tunnel, causing friction on the tendons, further inflaming the tenosynovium and tendons (The Stretching Institute, 1999-2010).

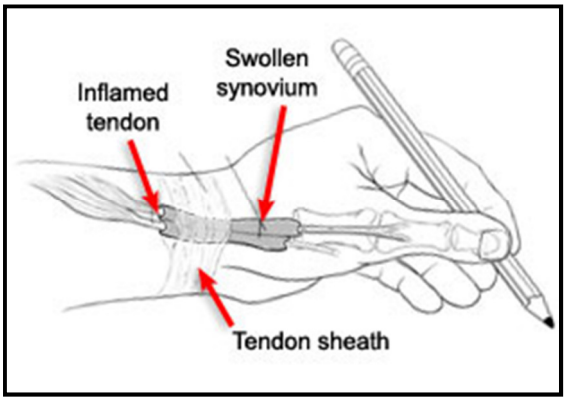

Figure 2. De Quervains tenosynovitis of the first extensor compartment (Griffin, 2005)

Two of the main tendons to the thumb pass through a tunnel (or series of pulleys) located on the dorsolateral aspect of the wrist. Tendons are covered by a slippery thin soft-tissue layer, called synovium. This layer allows the tendons to slide easily through the tunnel. Any swelling of the tendons located near these nerves can put pressure on the nerves. This can

cause wrist pain or numbness in the fingers (American Academy of Orthopedic Surgeons, 2007).

2.5.3. Pathology

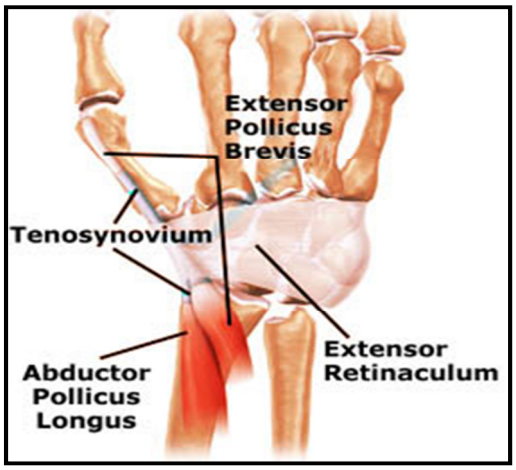

Figure 3. The mucous sheaths on the posterior aspect of the hand (Kasdan, 1999)

Abductor pollicis longus and extensor pollicis brevis have almost the same function: the movement of the thumb away from the hand in the plane of the hand. The impaired gliding is caused by the thickening of the extensor retinaculum (the thickened part of the general tendon sheath that holds the extensor muscles in place) of the wrist. De Quervain, a Swiss physician, is given credit for first describing this condition with a report of 5 cases in 1895 and 8 additional cases in 1912. On histopathological examination predominant features are degenerative changes (myxoid degeneration, fibrocartilaginous metaplasia and deposition of mucopolysaccharide). Pain is elicited by mechanical impingement between the tendon and fibro-osseous canal resulting in stimulation of nociceptors (Winters et al. 2009). In the first dorsal compartment of the wrist, a tendon sheath encloses the abductor pollicis longus and extensor pollicis brevis tendons at the lateral border of the anatomical snuffbox. Inflammation at this site commonly is seen in patients who use their hands and thumbs in a repetitive fashion. Thus de Quervains tenosynovitis can result from cumulative microtrauma. Inflammation also may occur after an episode of acute trauma to the site (Foye et al. 2010).

2.5.4. Causes

This disorder is the most common overuse injury involving the wrist and often occurs in individuals who regularly use a forceful grasp coupled with ulnar deviation of the wrist such as in a tennis serve or squash (Brotzman and Wilk, 1999). Excessive friction between the

tendons of abductor pollicis longus and extensor pollicis brevis in their common sheath causes fibrous thickening of the sheath and stenosis of the osseofibrous tunnel. This excessive friction is caused by repetitive forceful use of the hands during gripping and wringing (Moore and Dalley, 1999). Beers and Berkow (1999) stated that this disorder usually occurs after repeated use (especially in wringing), of the wrist although it is occasionally associated with rheumatoid arthritis.

2.5.5. Signs and symptoms

- Pain may be felt over the radial aspect of the wrist. Pain may appear gradually or suddenly. Pain may also be present in the forearm. The pain is usually worse when the hand and thumb are in use. This is especially true when forcefully grasping objects or twisting the wrist.
- Swelling may be present over the radial aspect of the wrist. This swelling may occur together with a fluid-filled cyst in this region.
- A "catching" or "snapping" sensation may be felt when moving the thumb.
- Pain and swelling may make it difficult to move the thumb and wrist.
- Numbness may be experienced on the posterior aspect of the thumb and index finger. This is caused as the nerve lying superior to the tendon sheath is irritated (American Academy of Orthopedic Surgeons, 2007).

2.5.6. Diagnosis

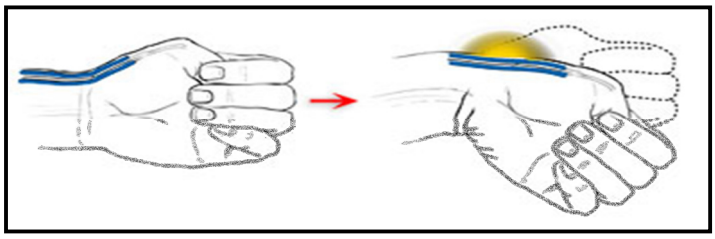

Figure 4. Finkelsteins test (American Academy of Orthopaedic Surgeons, 2007)

The Finkelstein test is conducted by making a fist with the fingers closed over the thumb and the wrist is bent toward the little finger. The Finkelstein test can be quite painful for the person with de Quervains tendinitis. Tenderness directly over the tendons on the thumb side

of the wrist is a common finding with this test (American Academy of Orthopaedic Surgeons, 2007).

Pain can be assessed using the visual analogue scale as in carpal tunnel syndrome. Neurological examination in de Quervains tenosynovitis follows the same procedure as in carpal tunnel syndrome. Range of movement is assessed using the universal goniometer and using the baseline values for comparison. Strength is evaluated using a hand dynamometer (American Academy of Orthopaedic Surgeons, 2007).

2.5.7. Treatment

Conservative Management

A thumb spica splint is used to immobilize the first dorsal compartment tendons with a commercially available splint or, depending on the patients comfort, a custom molded orthoplast device. The splint maintains the wrist in 15-20 degrees of extension and the thumb in 30 degrees of radial and palmar abduction. The interphalangeal joint is left free, and motion at this joint is encouraged. The patient wears the splint during the day for the first 2 weeks and at night until the next visit to the therapist, generally after 6-8 weeks. Splinting may continue longer, depending on the response to treatment. The splint can be discontinued during the day if symptoms permit and if daily activities are gradually resumed. Work place activities are advanced accordingly (Brotzman and Wilk, 1999).

Other considerations include:

- A corticosteroid sheath injection can be offered to patients with moderate to marked pain or with symptoms lasting more than 3 weeks. The injection should individually distend the abductor pollicis longus and the extensor pollicis brevis sheath. Discomfort after the injection is variable, and a 2-3 day supply of mild analgesic is recommended

- A systemic non-steroidal anti-inflammatory drug is commonly prescribed for the initial 6-8 weeks of treatment.

- Thumb use is restricted so that the first dorsal compartment tendons are at relative rest. Activities that require prolonged thumb interphalangeal joint flexion, pinch, or repetitive motions are avoided.

- Distal-to-proximal thumb coban wrapping, retrograde lotion, or ice massage over the radial styloid.
- Phonophoresis with 10% hydrocortisone can be used for edema control.
- Gentle active and passive thumb and wrist motion are encouraged 5minutes every hour to prevent joint contracture and tendon adhesions (Brotzman and Wilk, 1999).

Surgical treatment

Unsatisfactory symptom reduction or persistent symptoms requires surgical decompression. Multiple separate compartments for the abductor pollicis longus which typically has 2-4 slips and the extensor pollicis brevis require decompression. Extreme caution in the approach will spare sensory branches of the lateral antebrachial cutaneous nerve and dorsal sensory branches of the radial nerve. Before decompression, the encasing circular retinacular fibres that arc across the radial styloid should be exposed. The floor of this compartment is the tendinous insertion of the brachioradialis tendon, which sends branches to the volar and dorsal borders of the compartment. The abductor pollicis longus and extensor pollicis brevis tendons are difficult to differentiate. When this 'Y' tendinous floor is located, it can serve as a landmark to indicate decompression of the first dorsal compartment. A strict rehabilitation protocol is thereafter adhered to by the patient following surgical decompression (Brotzman and Wilk, 1999).

2.6. Conclusion

Repetitive strain injuries (RSI's) are easier to prevent than treat. It affects a large percentage of the labor force. People develop repetitive strain injuries because they are unaware of how to or are unable to protect their muscles, tendons and nerves. With planning and foresight, repetitive strain injuries can be prevented. People who can control their environment and the pace of their work can protect themselves. Repetitive strain injury is common and health care workers need to formulate an effective plan in order to educate the working population. Early treatment plans can prevent hand conditions from worsening. It has become evident that many countries other than South Africa have researched carpal tunnel syndrome and de Quervains tenosynovits in abundance. With regards to scientific studies, further research needs to examine prevalence, workstation demands as well as the awareness of garment workers with regards to their conditions.

Chapter 3

Methodology

3.1. Research design

This study was a non-experimental cross-sectional point prevalence study with exploratory quantitative measures. A researcher administered questionnaire was used to obtain information on presenting signs and symptoms and possible risk factors for carpal tunnel syndrome and de Quervains tenosynovitis. Clinical tests were performed on subjects to test for carpal tunnel syndrome and de Quervains tenosynovitis.

3.2. Sample

3.2.1. Selected garment factories in eThekwini

A sample of convenience was used in selecting the factories in the eThekwini District. This sampling was used for ease of access to the factories by the researcher. A total of six factories were utilized in this study.

3.2.2. Population

The population included all garment workers irrespective of age, gender or ethnic group. It was noted that all the factories had a different number of garment workers', therefore lists of all garment workers were requested from the employers. The total population of this study included 400 garment workers. Systematic random sampling was used where every second garment worker on each factory's attendance register was selected for the study. Thus, a sample size of 200 garment workers was used (n= 200).

3.3. Inclusion and exclusion criteria

3.3.1. Inclusion criteria

All garment workers who gave consent to participate in the study were included in the study.

3.3.2. Exclusion criteria

Participants presenting with the following were excluded from the study:

- Garment workers who were pregnant as carpal tunnel syndrome is common among pregnant women.

- Garment workers who have had previous upper limb fractures or arthritis.

Once all inclusion and exclusion criteria were satisfied, a sample size of 200 subjects was expected.

3.4. Data gathering instruments

3.4.1. Questionnaire

A questionnaire consisting of open-ended and closed questions was utilised to gather information about the subjects' biographical information, present and past medical history, employment details and presence of symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. Experts in the field of research and rehabilitation assisted in giving input on the questionnaire. This was done to assist with any changes to the questionnaire, if necessary and to establish if any information had been repeated or overlooked. Experts suggested that additional questions regarding tea, lunch and rest breaks be included in the questionnaire as well as questions on activities of daily living specific to carpal tunnel syndrome and de Quervains tenosynovitis be attached. A few questions possessed ambiguity and required rephrasing. If a participant's first language was not English, a translator was present during the interview and when the clinical tests were being performed. The consent forms as well as the questionnaire were also translated into Zulu for those participants whose first language was Zulu. To ensure accuracy of the Zulu translation, the English questionnaire was translated in to Zulu and thereafter translated back in to English to make sure it corresponded.

Reliability of the questionnaire was assured by having an observer present during the interviews. This was to ensure that the procedure is the same for all participants. Validity of the questionnaire was guaranteed by carrying out a pilot study involving 5 randomly selected subjects. Five randomly selected subjects were chosen from one of the 6 factories to participate in the pilot study. The researcher administered the questionnaire on receiving a signed consent from all 6 subjects. The pilot study was conducted in a private room already set up for the researcher and the subject. This was done to assess the instrument for any ambiguity, unclear or confusing questions and to execute any changes in the questionnaire. It was noted that the researcher needed to be clear on administering the questionnaire as these garment workers were unaware of these hand conditions.

3.4.2. Pain

A visual analogue scale (VAS) was used to measure the pain of the subjects. This was tested by having 2 vertical lines drawn on a page, one line for the subject's pain at rest and the other line for the subject's pain during activity. The subject was given 2 hand diagrams to plot their pattern of pain. Each subject was asked to about the presence and referral pattern of pain for each hand. Each line measured 10cm. The subject was asked to draw a horizontal line between 0 and 10 representing their pain during rest and activity bilaterally. The researcher then measured the distance from 0 to the horizontal line made by the subject. A hand chart was used to plot referral pain patterns.

3.4.3. Sensation

Fine touch was used to test sensation in both hands.

Tomberlin and Saunders (2001) stated that patients with carpal tunnel syndrome may present with decreased sensation. Problems are intermittent in early stages and constant in later stages. In a study to describe the somatosensory profiles of subjects with non-specific arm pain, sensation was assessed using cotton wool to detect fine touch. Stimuli were applied circumferentially repeatedly around the participant's upper limbs so that all dermatomes were assessed. Interrater reliability for assessment of dermatomes was found to be moderately reliable (Moloney et al. 2010).

3.4.4. Range of motion

A universal goniometer was used to assess wrist and thumb movements in both hands.

Tomberlin and Saunders (2001) stated that physiological tests are movement in standard planes with mobility examination consisting of active, passive and accessory movement tests. The movement tests help determine the structures involved and the extent to which they are involved. Since carpal tunnel syndrome and de Quervains tenosynovitis affects nerves, tendons and muscles, range of movement may be decreased due to signs and symptoms of pain, sensory disturbances and decreased muscle strength.

3.4.5. Grip strength

The Baseline hand held hydraulic dynamometer was used to assess grip strength in both hands.

Molenaar et al. (2008) undertook a study to determine which of two instruments (Jamar dynamometer or Martin vigorimeter) was more reliable in assessing grip strength in children. It was concluded that both instruments were reliable in measuring grip strength. It was also noted that the Jamar dynamometer had a better test-retest reliability and showed to be a more accurate instrument.

3.4.6. Clinical Tests

3.4.6.1. Phalens Test

The Phalens test was used to test for carpal tunnel syndrome. The reliability of this test depended on the subject being explained to and the test correctly demonstrated to the participant.

Kao (2003) stated, 'Phalens manoeuvre can be used in physical examination to support a diagnosis of carpal tunnel syndrome.'

3.4.6.2. Reverse Phalens Test

This test was also used to reproduce symptoms of carpal tunnel syndrome.

In studies of diagnostic accuracy, the sensitivity of the Phalens manoeuvre ranged between 10% and 91% and its specificity from 33% to 100% (Aroori and Spence, 2007). The Reverse Phalens test is used in clinical practice when the Phalens test does not reproduce symptoms of carpal tunnel syndrome.

3.4.6.3. Finkelsteins Test

Finkelsteins test was used to test for de Quervains tenosynovitis. This test is used daily in the clinical diagnosis of this condition and is therefore suggested to be reliable and valid on condition that it is explained and demonstrated correctly to every subject.

Ahuja et al. (2003) stated, 'Finkelsteins test is used to diagnose de Quervains tenosynovitis in people who have wrist pain.'

3.5. Procedure

a) Consultation Phase

The researcher conferred with various professionals in the field of research as well as hand therapy. These professionals included registrars in the field of orthopaedics; lecturers associated with research, hand therapists who have completed research in hand therapy as well as physiotherapists and occupational therapists with interest in the field of hand therapy. The supervisor was consulted for information and planning of this study. Thereafter a comprehensive literature search was undertaken to construct a structure for the study.

The Research Ethics Committee of UKZN granted ethical approval. A statistician was consulted for information on planning and devising the questionnaire for accurate data analysis. Factory owners of each of the six factories were initially contacted telephonically. This was done to inform them of the aims and objectives of the study and to request permission to allow their staff to participate in the study at their premises. A letter including more details of the study was followed. Once permission from the factory owners was received, a date and time was set up for data collection.

b) Fieldwork

A room/office with a table and two-three chairs was set up for the study. It was a quiet, comfortable and private environment where the participant felt at ease to participate in the study. Each subject was briefed on the aims and objectives of the study and they were required to give consent to participate in the study. Participants were assured that their participation is voluntary and that they could withdraw from the study at any time. Once informed consent was obtained, the researcher administered the questionnaire which had an allocated time of approximately fifteen minutes. Thereafter the clinical tests was performed which took approximately fifteen minutes. Each participant was seated across from the researcher in an upright position with both feet flat on the floor.

Pain was assessed by using the visual analogue scale. The subject was asked to draw 2 horizontal lines on two 10cm plotted vertical lines. The first line for documenting pain at rest and the second line to document pain during activity. This was done for each hand. Thereafter the subject was asked to plot their pattern of pain for each hand.

Sensation was then assessed using a of cotton wool ball. The researcher held two pieces of cotton wool, one in each hand. The subject was asked to close their eyes during the procedure. The researcher ran the first piece of cotton wool from the arm down to the hand (proximal to distal), followed by the next limb. The dermatome being tested for the median nerve distribution was C6 and C7 on the palmar side as shown in Fig. 5. The subject was asked if they felt the cotton wool and if the feeling was the same on both sides. This was recorded as diminished, increased, normal or no sensation. This was recorded in Appendix 3a.

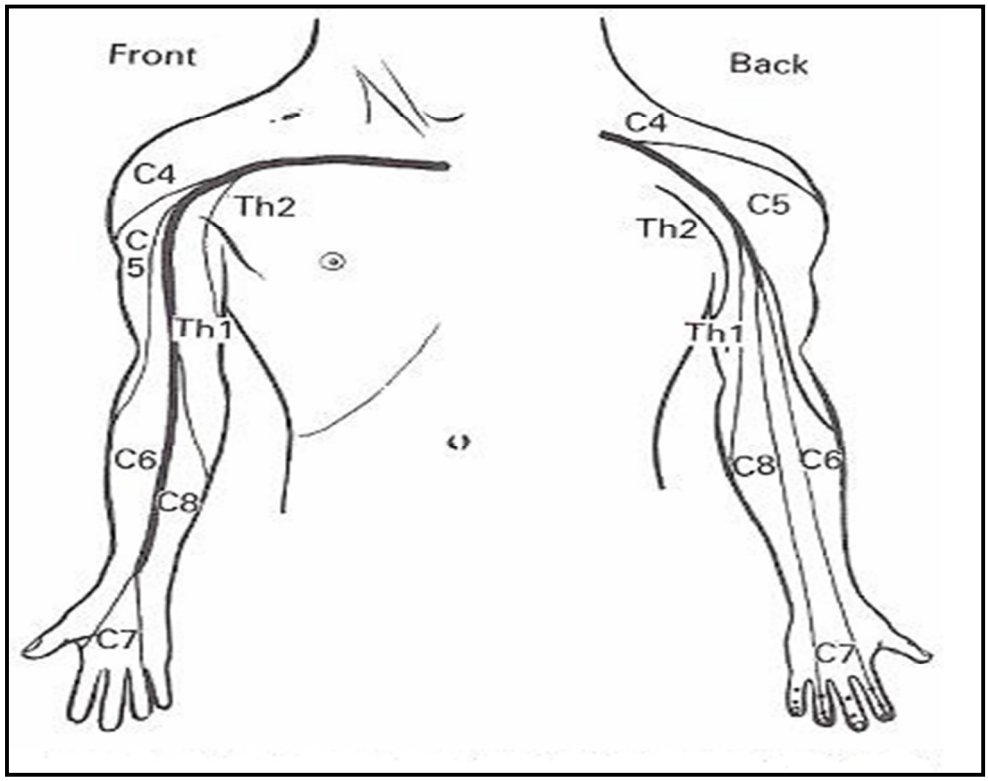

Figure 5. Approximate dermatomes and axial lines for the right upper limb

(Tomberlin and Saunders, 2001)

Range of movement was assessed by using a universal goniometer to assess wrist and thumb movements bilaterally. This was compared to the normal range of movement suggested by Trombly and Radomski, 2001).

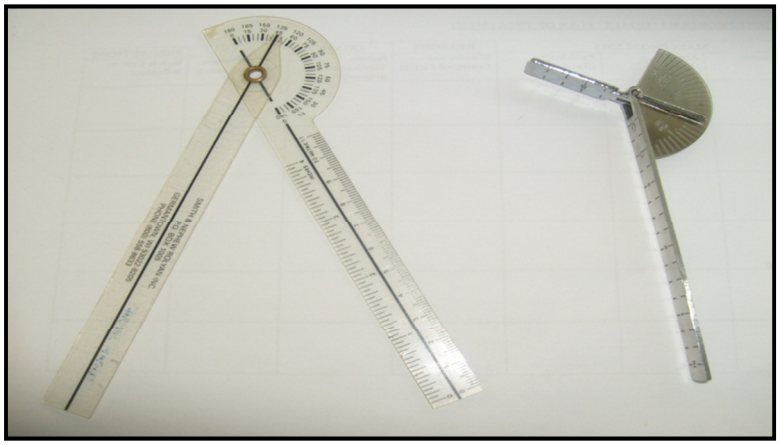

Figure 6. The wrist and digit goniometer

The researcher measured flexion and extension of the wrist by first positioning the forearm in neutral. The axis of the goniometer was then placed at the wrist joint with the stationary arm positioned along the radial aspect of the forearm and the movable arm positioned along the thumb and index finger. The subject was then asked to actively move the hand forward as far as they could for flexion and as far back as they can for extension.

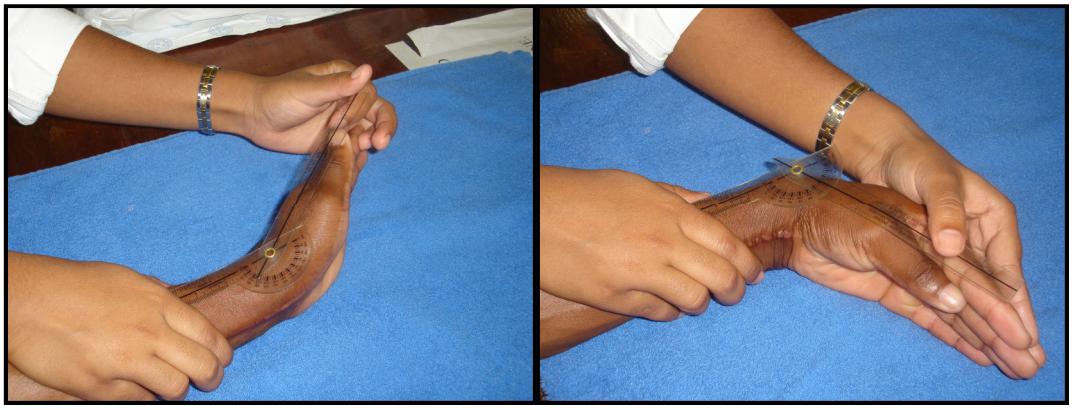

Figure 7: Goniometry of wrist extension Figure 8: Goniometry of wrist flexion

Radial deviation and ulna deviation was obtained by placing the hand in pronation with the palms flat in the table. The axis of the goniometer was placed at the wrist joint with the stationary arm positioned along the forearm and the movable arm placed in line with the

middle finger. The subjects were asked to move the hand towards the body for radial deviation and away from the body for ulna deviation. Thumb flexion and extension was assessed with the axis placed over the metacarpal joint, the stationary arm placed along the radial aspect of the forearm and the movable arm placed along the thumb, while the forearm is in neutral position. The hand was then placed in pronation with the palm flat on the table. Abduction and adduction was assessed with the axis being fixed at the metacarpal joint of the thumb, the stationary and movable arm in line with the index finger. The subject was then asked to move the thumb away from the index finger and towards it (Trombly and Radomski, 2001).

The interphalangeal joint of the thumb was assessed by positioning the forearm in neutral. The axis of the goniometer was placed at the interphalangeal joint with the stationary arm along the thumb and radial side of the forearm and the movable arm towards the distal part of the thumb. The subject was asked to bend and straighten the distal part of the thumb. Three consecutive readings were taken and an average of the three calculated. If active range of movement was decreased, subjects were questioned on what was limiting the movement which was documented on the data sheet as the limiting factor (Trombly and Radomski, 2001).

Grip strength using the Baseline Hand Hydraulic Dynamometer was used to assess the strength of both hands. The procedure was initially demonstrated by the researcher for accuracy of the results. The participant was seated upright in the chair with the feet flat on the floor. The handle of the dynamometer was then placed in the participants' hand. The participant was asked to tighten the hand in to a powerful fist. The same procedure was completed for the opposite hand. Two readings with an average of both readings for each hand were taken.

The Phalens test was explained and demonstrated together with the presentation of the symptoms at the time of the test. The participant held his/her forearm upright, pointing the fingers towards the floor and pressing the back of the hands together. This position was maintained for one minute that was timed by the researcher. The presence of carpal tunnel syndrome was suggested if one or more symptoms such as tingling or increasing numbness were felt in the fingers in one minute (Aroori and Spence, 2007). The results of the test were documented in the space provided on the questionnaire (Appendix 3a).

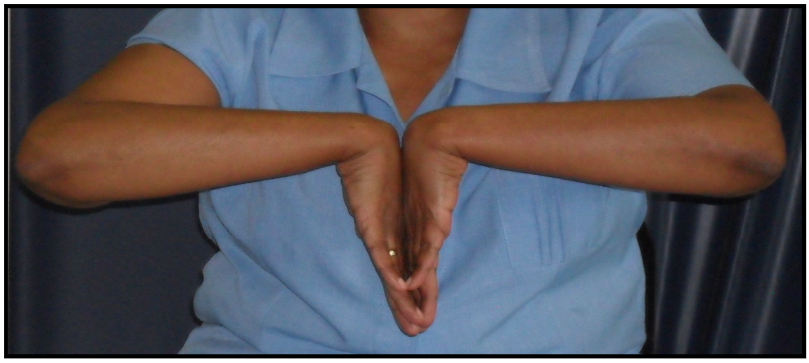

Figure 9 illustrates the Phalens test

The Reverse Phalens test was also used in conjunction with the Phalens test to test for carpal tunnel syndrome. It was also explained and demonstrated by the researcher prior to the test. The participant held his/her forearm upright, pointing the fingers towards the ceiling and pressing both palms firmly together. This position was maintained for two minutes and was timed by the researcher. The presence of carpal tunnel syndrome was suggestive if one or more symptoms such as tingling or increasing numbness were felt in the fingers in one minute (Tuen, 2007). The results of the test were documented in the space provided on the questionnaire (Appendix 3a).

Figure 10 illustrates the Reverse Phalens test

De Quervains tenosynovitis was tested using Finkelsteins test. The participant maintained the same sitting position as for the Phalens test. The test was explained and demonstrated to the subject. The subject held his/her thumb across and the palm of his/her hand made a fist and thereafter bent the wrist towards the floor. If a sharp pain was felt in the first dorsal compartment or in the area of the radial styloid, the test was positive for de Quervains tenosynovitis (American Academy of Orthopaedic Surgeons, 2007). Once all data was collected, data analysis commenced.

Figure 11 **Figure 12**

Figure 11 and 12 are illustrates of the Finkelsteins test (Kasdan, 1999)

3.6. Ethical considerations

Informed consent for participation in the study was obtained from all participants. Participants were informed that all information was to be kept confidential and that they were free to withdraw from the study at any time. The results were grouped together so that factories and participants could not be identified and the results were to be based on the study as a whole. Other staff who would have liked to be tested was tested but the results were not analysed for the study.

The data gathering instruments were not designed to personally intimidate or threaten in any way. All participants whether tested positive or negative did ethically benefit from the study. This was done by the researcher formulating an exercise program and an information sheet in the form of a booklet for all participants as part of advice and education. The exercise program included exercises specific to carpal tunnel syndrome and de Quervains tenosynovitis and was given to each participant. The exercise program chosen for this study as a form of education for the participants was devised by the American Academy of Orthopaedic Surgeons in 2000. The information sheet consisted of advice and education based on the conditions above in the form of definition, anatomy, symptoms, causes, risk factors and prevention and treatment options. Participants were not asked to perform the exercises provided in the information booklet until they have visited a medical doctor for further testing and advice if they presented with signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis so as to not exacerbate their symptoms further. If participants required further investigation or treatment following the results of their tests, they were advised by the researcher to seek medical help accordingly.

3.7. Data analysis

The data from the questionnaire was captured and analysed using the Statistical Package for Social Sciences (SPSS version 17). Descriptive statistics such as mean, standard deviation, proportions, median, mode and interquartile range was used to summarize the data. Pearson's Chi Square tests and Fishers Exact tests were used to test for association between two categorical variables. Independent Samples t-tests were used to determine the difference in age distribution between participants that presented with carpal tunnel syndrome and de Quervains tenosynovitis and of those who did not. The level of significance was set at 0.05. Bar graphs, tables and pie charts will be used to present the results.

Chapter 4

Results

4.1. Introduction

Two hundred garment workers participated in the study, after meeting the inclusion criteria.

4.2. Socio-demographic characteristics of the participants

4.2.1. The demographic details of the participants are represented in the table below.

Table 3: Demographic details of participants'

Demographics												
Age				Sex			Population Groups			Marital Status		
Range	No.	%	Mean		No.	%		No.	%		No.	%
20-35	45	23	30	Male	26	13	African	104	52	Single	59	29.5
36-50	55	27	44				Indian	80	40	Married	86	43
>50	100	50	56	Female	174	87	Coloured	14	7	Divorced	27	13.5
							White	2	1	Widowed	26	13
										Living with Partner	2	1

The above table shows the percentages of participants for the demographics as documented according to age, sex, population groups and marital status. Independent Samples t-tests were used to determine if there was an association between age and carpal tunnel syndrome or with age and de Quervains tenosynovitis. Probability values (P) showed that there was no association. The Pearson's Chi Square tests were used to establish an association between sex and carpal tunnel syndrome and sex and de Quervains tenosynovitis. P values were 0.524 and 0.675 respectively showing no association. Fishers Exact tests showed that there was no association between population groups and carpal tunnel syndrome (P=0.079) or population groups and de Quervains tenosynovitis (P=0.247). There was also no association between marital status and carpal tunnel syndrome (P=0.406) or marital status and de Quervains tenosynovitis (P=0.764) as shown by the Pearson's Chi Square test.

4.2.2. Participants hobbies

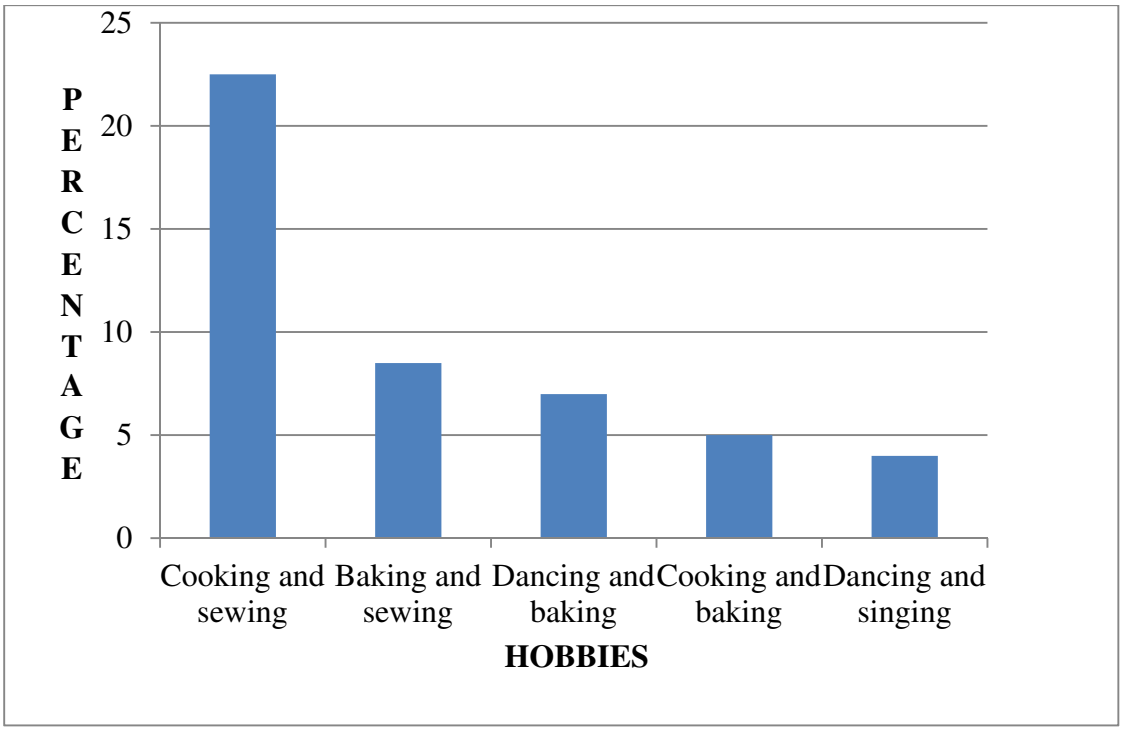

Figure 13: Bar graph illustrating participants' hobbies

The above graph shows the different types of hobbies as indicated by the participants. Majority of the participants 22.5% indicated that cooking and sewing were their hobbies whilst 8.5% enjoyed baking and sewing. Another seven percent stated that dancing and baking was what they did in their spare time. Five percent noted that cooking and baking were their hobbies and 4% indicated that and dancing and singing is what they enjoyed. Other responses when asked about hobbies were gardening, swimming, and drag racing, watching television and spending time with family.

4.2.3. Participants sports activities

Nine and a half percent of participants stated that they played sport. Soccer and netball was indicated the most, whilst other sport like cricket, karate, running, jogging, table tennis, volley ball and walking was also mentioned. These sports were most often played daily 3.5% or weekly 4%.

4.2.4. Participants hand dominance

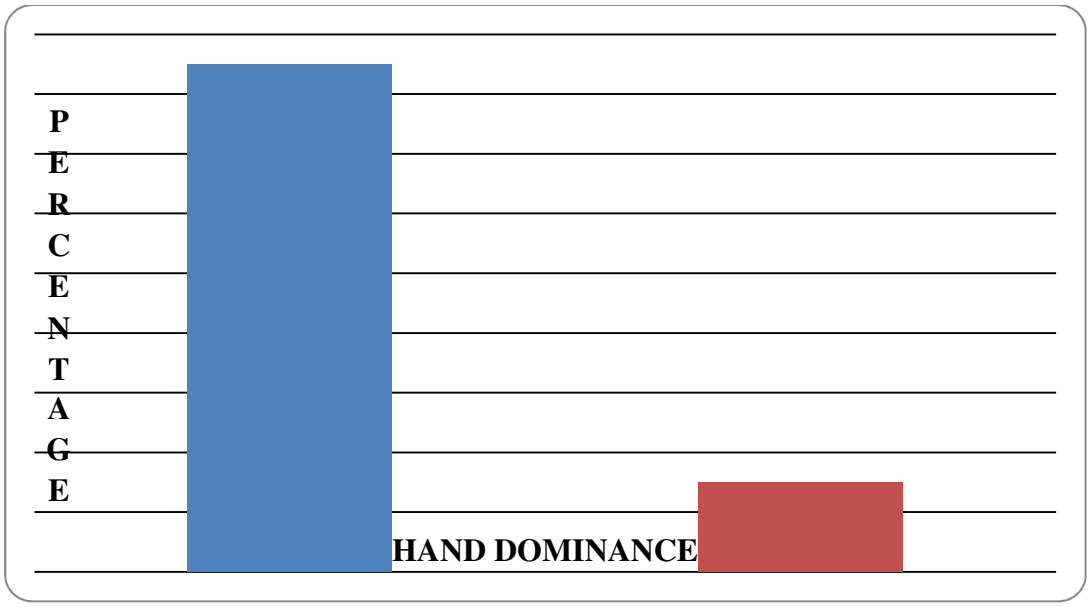

Figure 14: Bar Graph illustrating Participants Hand Dominance

The above bar graph shows that 30 participants 15% were left hand dominant whereas 170 of the participants 85% were right hand dominant.

4.2.5. Participants level of education

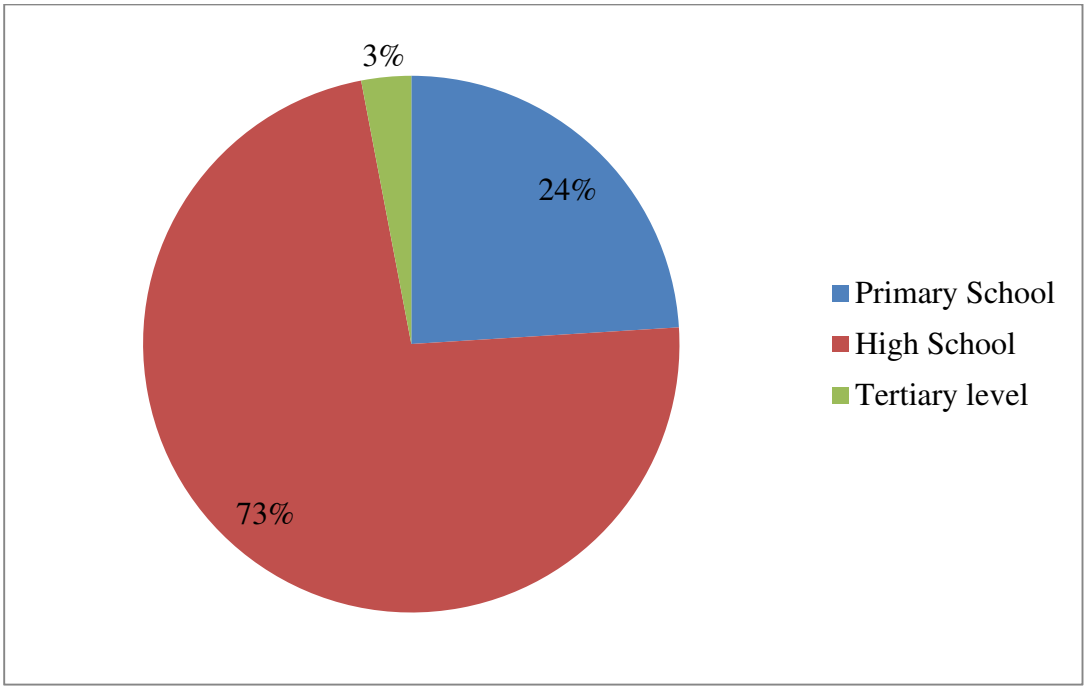

Figure 15: Pie chart illustrating participants' highest level of education

Twenty four percent of participants' highest level of education was primary school, 73% attended high school and 3% had tertiary level education.

4.3. Present and past medical history

All participants stated that they did not have any medical problems whilst only 0.5% indicated pain in the thumb. None indicated taking any medication.

4.4. Participants occupational details

Table 4 shows that 67% of participants were among the machinists. Other roles included in the study were graphic designers and those working in the sales department.

Table 4: Participants' role in manufacturing the garment

Role	**Frequency**	**Percentage (%)**
Machinist	134	67
Service hand	10	5
Cleaner	5	2.5
Presser	6	3
Checker	11	5.5
Dispatcher	13	6.5
Cutter	7	3.5
Layer	3	1.5
Marker	2	1
Pattern maker	3	1.5
Other: Graphic Designer	5	2.5
Sales	1	0.5

4.4.1. Participants employment history

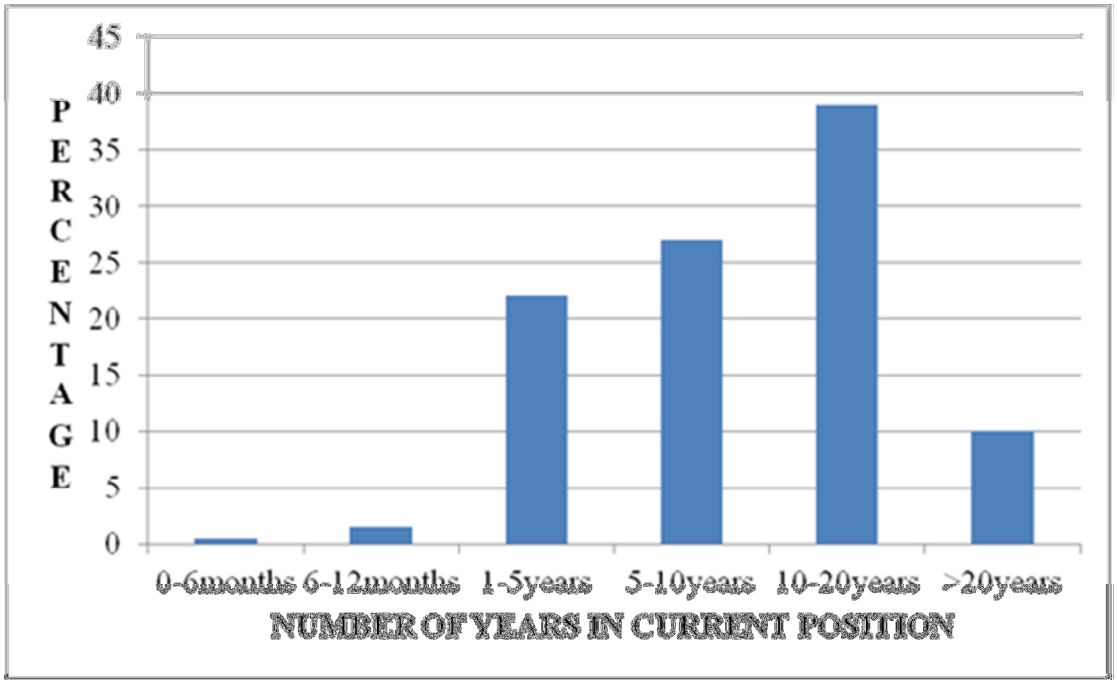

Figure 16: Bar graph illustrating the number of year's participants' worked in the current position

Figure 16 shows the percentage of garment workers working in their positions over a period of time. Thirty nine percent of participants worked in their positions for 10 to 20 years while 27% and 22% worked for 5 to 10 years and 1 to 5 years respectively. Ten percent worked for more than twenty years while 2% worked for less than a year in their respective positions. Fishers Exact tests showed no association to de Quervains tenosynovitis (P=0.818) or carpal tunnel syndrome (P=0.183).

4.4.2. Training experience

Participants were questioned on the type of training done for their jobs. Ninety three percent stated that they had no formal training and learnt on their own. Four percent attended small clothing industry schools or classes for cutting, sewing and dressmaking whilst the other three 3% attended a technikon or university.

4.4.3. Participants hours of work including break

Table 5 shows 81% of participants worked for 2 to 2.5 hours before a break. Nine percent worked for 1 to 2 hours whilst 5% worked for 2.5 to 3 hours. Another 5% indicated that they worked for 3 hours 15 minutes before a break. The break indicated by most 98.5% of

participants was 10 to 15 minutes while 1.5% had a 15 to 20 minute break after working the morning session. The activities performed during these breaks ranged from 98.5% eating or consuming liquids during this time whilst 1% slept and 0.5% socialized during this time.

Table 5: Working hours with breaks and activity during breaks (morning session)

Morning Session (hours)	Percentage (%)	Morning Session (break)	Percentage (%)
1 – 2	9	10 – 15mins	98.5
2 - 2.5	81	10 – 20mins	1.5
2.5 – 3	5		
Other: 3 hours 15minutes	5		

Table 6 indicates that 70.5% of participants worked 2 to 2.5 hours and 29.5% worked 2.5 to 3 hours before a break. It also shows that 99.5% had a 15 to 30 minute break and 0.5% had a 30 to 45 minute break after working the mid – morning session. Activities during these breaks included eating or drinking by 89% of participants, 0.5% continued working, another 10% socialized whilst 0.5% stated that they attended mosque during their break.

Table 6: Working hours with breaks and activity during breaks (mid – morning session)

Mid - Morning Session (hours)	Percentage (%)	Mid - Morning Session (break)	Percentage (%)
2 - 2.5	70.5	15 - 30mins	99.5
2.5 – 3	29.5	30 – 45mins	0.5

Table 7 indicates that 75.3% of participants worked 1 to 1.5 hours and 10.5% worked 1.5 to 2 hours before a break. Another 9.1% worked 2 to 2.5 hours whilst 5.1% worked 4 hours before a break. It also shows that 92%had a 5 to 10 minute break and 2.5% had a 10 to 15 minute break after working the afternoon session. Another 0.5% stated that they had a 0 to 2 minute break whilst 5% indicated that they had no afternoon break. Ninety five percent of participants stated that they continued working during the afternoon break whilst the remaining 5% had no afternoon break.

Table 7: Working Hours with Breaks and Activities during Breaks (afternoon session)

Afternoon Session (hours)	Percentage (%)	Afternoon Session (break)	Percentage (%)
1 – 1.5	75.3	5 - 10mins	92
1.5 – 2	10.5	10 – 15mins	2.5
2 – 2.5	9.1	Other: 0-2mins	0.5
Other: 4 hours	5.1	No break	5

4.4.4. Participants total number of hours of work per day

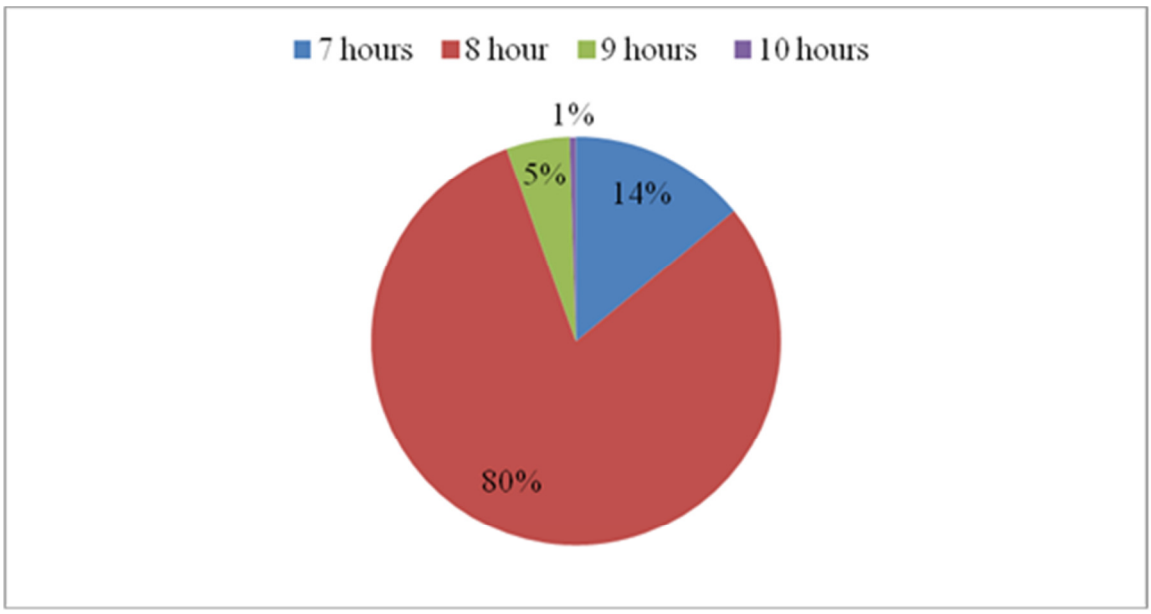

Figure 17: Pie chart illustrating the number of hours worked per day

The above pie chart illustrates that 80% of participants worked an 8 hour shift whilst 14% worked 7 hours, 5% worked 9 hours and 1% worked 10 hours daily. According to Fishers Exact tests there was no correlation between the hours participants worked on a daily basis to de Quervains tenosynovitis (P=0.416) or to carpal tunnel syndrome (P=0.689).

4.4.5. Number of garments produced per hour by all garment workers

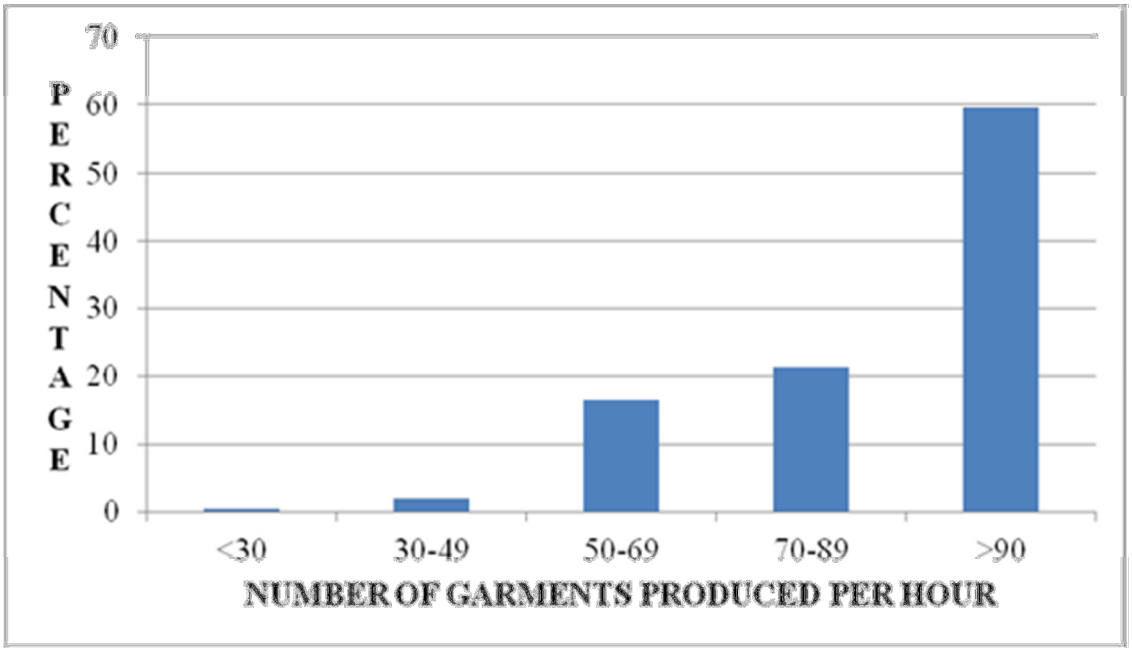

Figure 18: Bar Graph illustrating the number of garments produced per hour

Figure 18 illustrates that 0.5% of all participants produce less than thirty garments every hour, 2% produce between 30 to 49 garments, 16.5% produce between 50 to 69 garments, 21.5% produce between 70 to 89 garments and 59.5% produce greater than ninety garments every hour. Fishers Exact tests indicated that there was no association between the number of garments produced by garment workers to de Quervains tenosynovitis (P=0.693) or to carpal tunnel syndrome (P=0.866).

4.4.6. Participants work setting

Table 8 shows that 100% of participants stated that their jobs entail working under the listed conditions and 72.5% indicated that their job consists of working with vibratory tools. The remaining 27.5% have stated that they do not work with vibratory tools. No statistics were computed for applying weight through the arms, repeated movements, unsupported positions and fast hand movements as all participants indicated working under those conditions. Fishers Exact tests indicated there was no association between participants who hold or grasp objects for more than 2 hours to de Quervains tenosynovitis (P=0.430) or to carpal tunnel syndrome (P=1.000). Pearson's Chi Square tests showed no association of use of vibratory tools to de Quervains tenosynovitis (P=0.666) or to carpal tunnel syndrome (P=0.188).

Table 8: Percentage of participants working under the following setting

Setting	**Percentage (%)**
Applying weight through the arms	100
Repeated movements	100
Working with arms in unsupported positions	100
Fast hand movements	100
Holding or grasping for > 2 hours	100
Use of vibratory tools	72.5

4.4.7. Health and safety in the workplace

Participants were questioned on health and safety at their workplace. The majority 96.5% stated that no health and safety information was given to them. The 3.5% of participants who indicated they were given health and safety information stated that the information included cleanliness, hygiene, protective wear, exit doors and fires. Fishers Exact tests showed no association between health and safety information to de Quervains tenosynovitis (P=1.000) or to carpal tunnel syndrome (P=1.000). In addition, Fishers Exact tests also showed no association between health and safety representative on site to de Quervains tenosynovitis (P=1.000) or to carpal tunnel syndrome (P=1.000). All participants stated that they did not have a nurse on site and if an injury did occur in the workplace that required medical attention, 99.5% stated that they would be rushed to the nearest hospital whilst 0.5% only had access to a first aid box at the factory where they were employed.

4.5. Participants signs and symptoms

4.5.1. Pain

4.5.1.1. Participants pain perception using the visual analogue scale (VAS)

The following table shows the percentage of participants who presented with pain at rest and pain during activity for the left and right hands. The pain columns indicate the pain score calculated on the visual analogue scale.

Table 9: Pain using the visual analogue scale

Pain at Rest – Right Hand		**Pain at Rest – Left Hand**		**Pain during Activity- Right Hand**		**Pain during Activity- Left Hand**	
Pain	%	Pain	%	Pain	%	Pain	%
0	95.5	**0**	95.5	**0**	49	**0**	55
1	0.5	**1**	0.5	**1**	0.5	**2**	2
5	1.5	**2**	0.5	**2**	2	**3**	2.5
6	1.5	**5**	1.5	**3**	2.5	**4**	3
8	1	**6**	1.5	**4**	8	**5**	7.5
		8	0.5	**5**	10	**6**	3.5
				6	10	**7**	15
				7	9	**8**	7
				8	6.5	**9**	3.5
				9	0.5	**10**	1
				10	2		

Table 10 shows the percentage of participants who presented with pain in their hands at rest and during activity.

Table 10: Visual analogue scale readings versus norms (Chris Adams, 2010)

Pain at Rest – Right Hand		**Pain at Rest – Left Hand**		**Pain during Activity- Right Hand**		**Pain during Activity- Left Hand**		**Norms**
Pain	%	Pain	%	Pain	%	Pain	%	**0 - 1 No Distress**
0	95.5	**0**	95.5	**0**	49	**0**	55	**2 - 3 Annoying**
1	0.5	**1**	0.5	**1**	0.5	**2**	2	**4 – 5 Uncomfortable**
5	1.5	**2**	0.5	**2**	2	**3**	2.5	**6 - 7 Dreadful**
6	1.5	**5**	1.5	**3**	2.5	**4**	3	**8 - 9 Horrible**
8	1	**6**	1.5	**4**	8	**5**	7.5	**10 – Agonizing**
		8	0.5	**5**	10	**6**	3.5	
				6	10	**7**	15	
				7	9	**8**	7	
				8	6.5	**9**	3.5	
				9	0.5	**10**	1	
				10	2			

4.5.1.2. Participants location of pain

Table 11 shows the percentages of participants who stated "Yes" or "No" for pain as indicated in Table 11.

Table 11: Location of pain

Location of Pain	Yes (%)	No (%)
Left posterior Wrist	22	78
Left posterior Thumb	23.5	76.5
Left posterior Fingers	0.5	99.5
Left anterior Wrist	24.5	75.5
Left anterior Thumb	20	80
Left anterior Fingers	0	100
Right posterior Wrist	22.5	77.5
Right posterior Thumb	24	76
Right posterior Fingers	0	100
Right anterior Wrist	25	75
Right anterior Thumb	22.5	77.5
Right anterior Fingers	0	100

4.5.2. Sensation

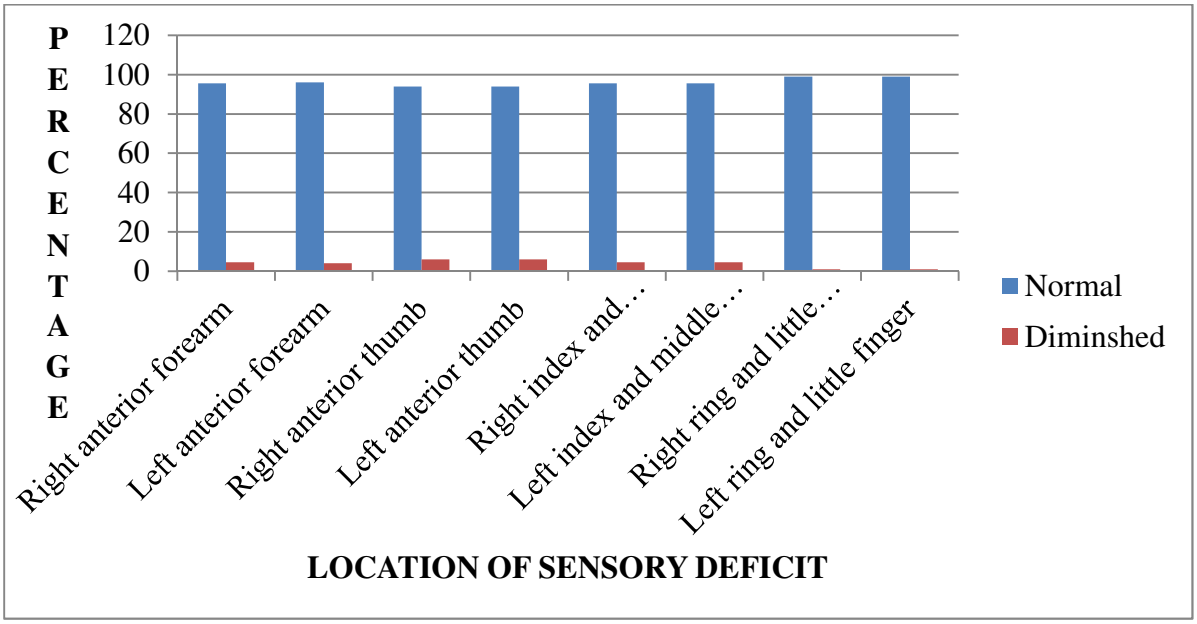

Figure 19: Bar Graph illustrating Participants' Sensory Deficits

The above graph shows 4.5% and 4% had diminished sensation in the right and left anterior forearm respectively. Another 6% presented with diminished sensation to the right and left

anterior thumb. An additional 4.5% also presented with diminished sensation to the right and left index and middle fingers whilst only 1% had diminished sensation in the right and left ring and middle fingers.

4.5.3. Range of movement

Range of movement was tested at the wrist, thumb metacarpal phalangeal and interphalangeal joints. None of the participants presented with decreased range of movement.

4.5.4. Functional abilities

4.5.4.1. Participants performance on specific activities of daily living relevant to carpal tunnel syndrome

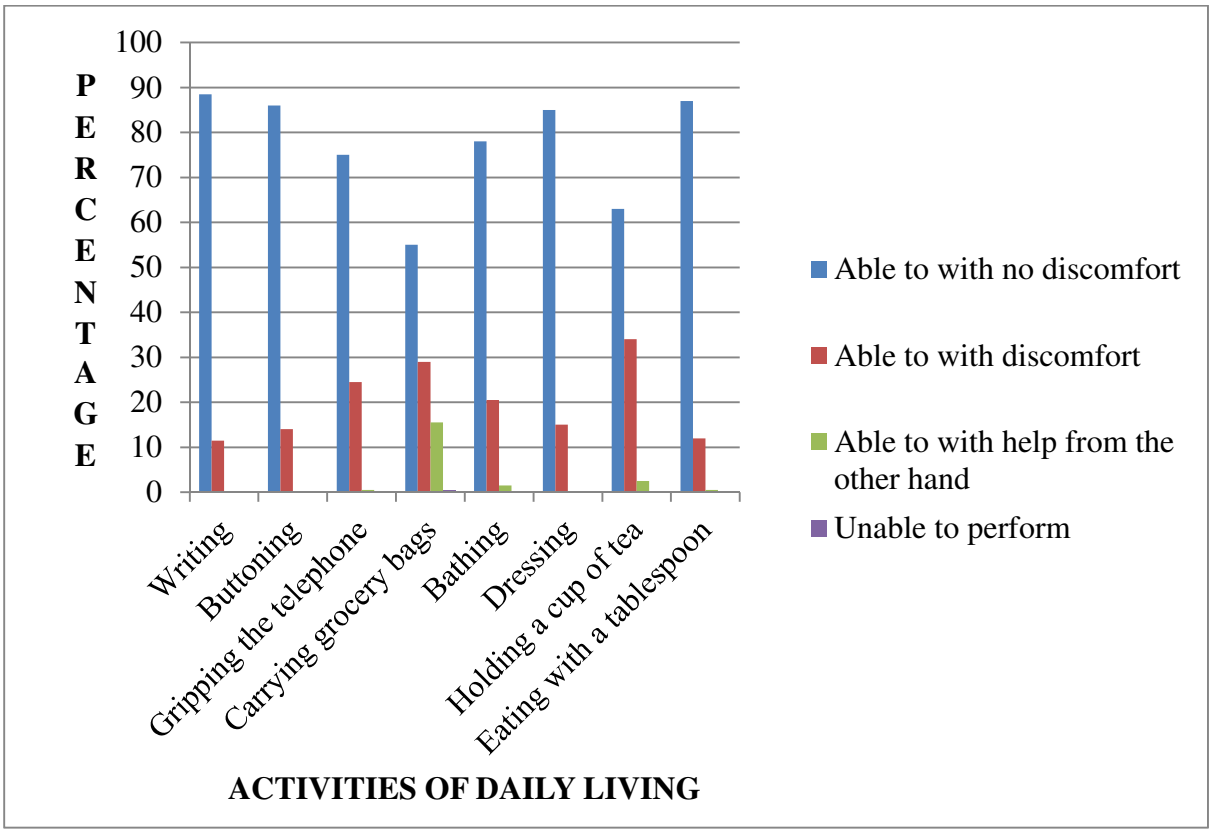

Figure 20: Bar graph illustrating participants' performance to activities of daily living relevant to carpal tunnel syndrome

Figure 20 shows that 88.5% of participants were able to write with no discomfort whilst 11.5% were able to write but with discomfort. Eighty six percent was able to button their clothes with no discomfort whilst 14% were able to button but with discomfort. Seventy five percent could grip the telephone with no discomfort whilst 24.5% were able to grip the

telephone but with discomfort. The remaining 0.5% were able to grip the telephone but with help from the other hand. Fifty five percent were able to carry grocery bags with no discomfort, 29% were able to carry grocery bags but with discomfort. Another 15.5% stated that they needed help from the other hand and 0.5%was unable to carry grocery bags. Seventy eight percent of participants stated that they were able to bath with no discomfort whilst 20.5% could bath with discomfort and 1.5% required help from the other hand. Eighty five percent of participants were able to dress themselves with no discomfort whereas 15% were able to dress themselves independently but with discomfort. Sixty three and a half percent of participants were able to hold a cup of tea with no discomfort whilst 34% were able to perform the activity but with discomfort and 2.5% needed help from the other hand. Eighty seven percent of participants were able to eat with a tablespoon whilst 12% could do it with discomfort and 0.5% needed help from the other hand.

4.5.4.2. Participants performance on specific activities of daily living relevant to de Quervains tenosynovitis

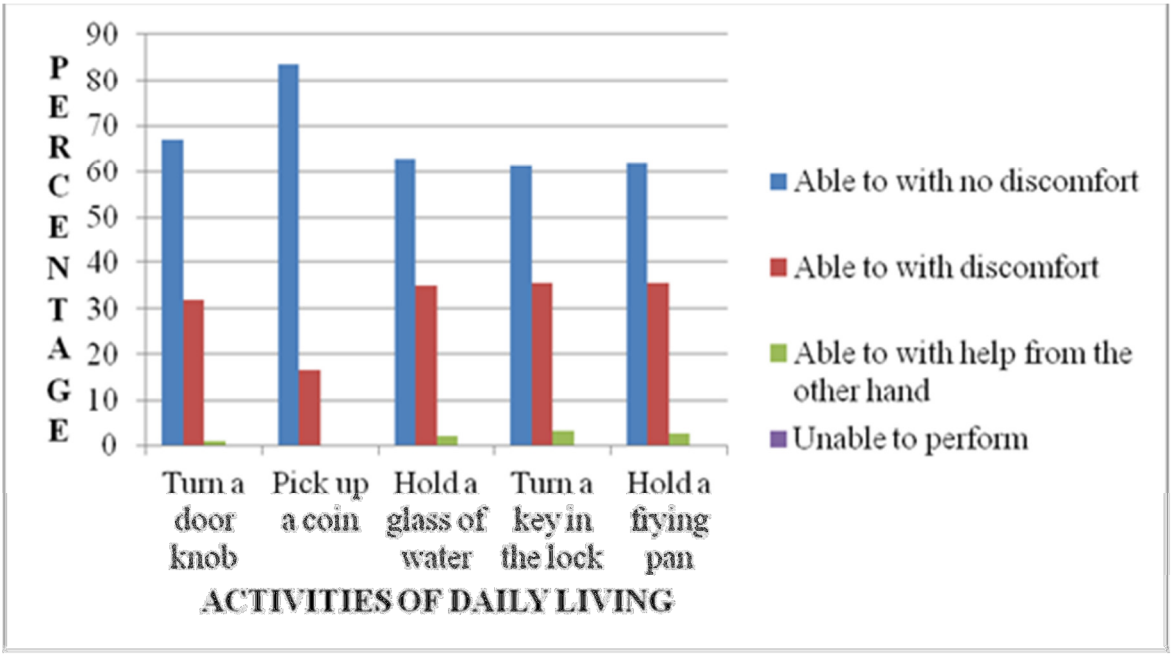

Figure 21: Bar graph illustrating participants' performance to specific activities of daily living relevant to de Quervains tenosynovitis

Figure 21 shows that 67% of participants were able to turn a door knob with no discomfort whilst 32% were able to perform the activity with discomfort and 1% needed assistance from the other hand. When asked about picking up a coin, 83.5% were able to do it with no

discomfort and 16.5% were able to do it with discomfort. Sixty three percent of participants were able to hold a glass of water with no discomfort whilst 35% were able to do it with discomfort and 2% of participants required assistance from the other hand. The graph also shows that 61.5% of participants were able to turn a key on the lock with no discomfort whilst 35.5% were able to perform the activity but with discomfort and 3% needed help from the other hand. Sixty two percent of participants were able to hold a frying pan with no discomfort whilst 35.5% were able to do it but with discomfort and 2.5% required assistance from the other hand.

4.5.5. Carpal tunnel syndrome

4.5.5.1. Symptoms of carpal tunnel syndrome

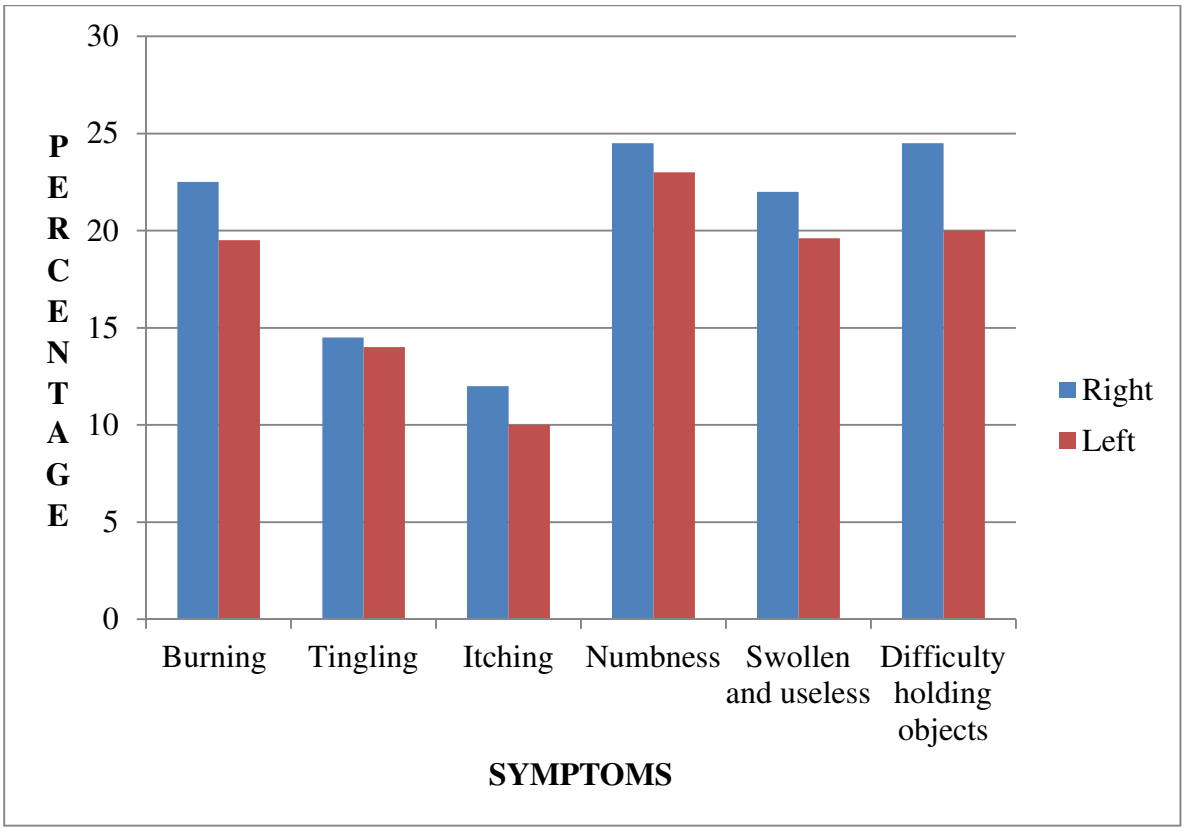

Figure 22: Bar graph illustrating participants' symptoms of carpal tunnel syndrome

Figure 22 shows that 22.5% and 19.5% of participants stated that they had a burning feeling in the right and left hands respectively. Tingling was present in 14.5% of participants in the right hand and 14% in the left hand. Twelve percent of participants reported they had itching in the right hand and 10% reported they had itching in the left hand. The graph also shows that 24.5% and 23% complained of numbness in the right and left hands respectively. Twenty

two percent and 19.6% stated that they felt their right and left hands swollen and 'useless' at times. Lastly, 24.5% and 20% stated that they felt difficulty holding objects in their right and left hands respectively.

4.5.5.2. Symptoms post Phalens test

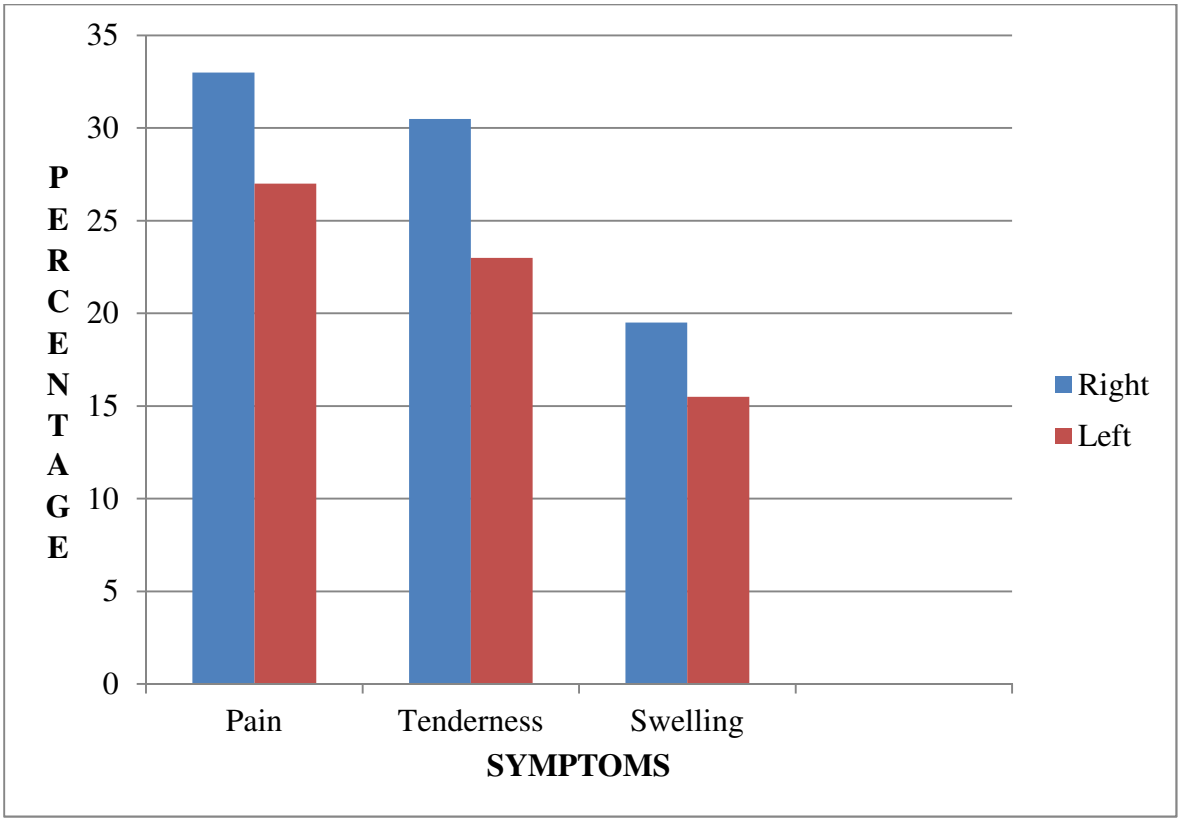

Figure 23: Bar graph illustrating participants' symptoms post Phalens test

Figure 23 shows that 24% and 19% of participants presented with a burning feeling in the right and left hands respectively following the Phalens test. Tingling was present in 16% of participants in the right hand and 14.5% in the left hand. Twelve and a half percent of participants reported they had itching in the right hand and 10% reported they had itching in the left hand. The graph also shows that 26.5% and 23% complained of numbness in the right and left hands respectively.

4.5.5.3. Symptoms post Reverse Phalens test

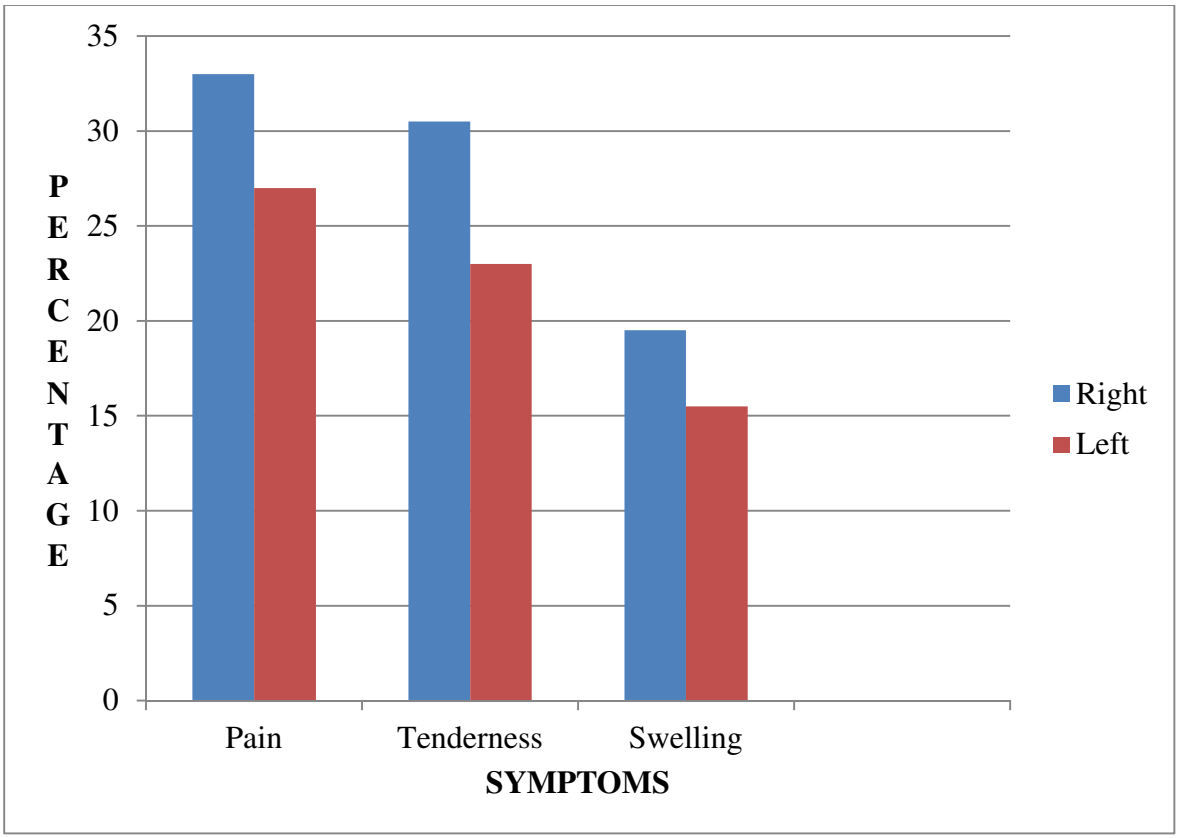

Figure 24: Bar graph illustrating participants' symptoms post Reverse Phalens test

Figure 24 shows that 22.5% and 18.5% of participants stated that they had a burning feeling in the right and left hands respectively following the Reverse Phalens test. Tingling was present in 16% of participants in the right hand and 14.5% in the left hand. Eleven and a half percent of participants reported they had itching in the right hand and 10.5% reported they had itching in the left hand. The graph also shows that 26.5% and 23% complained of numbness in the right and left hands respectively.

4.5.5.4. Phalens test

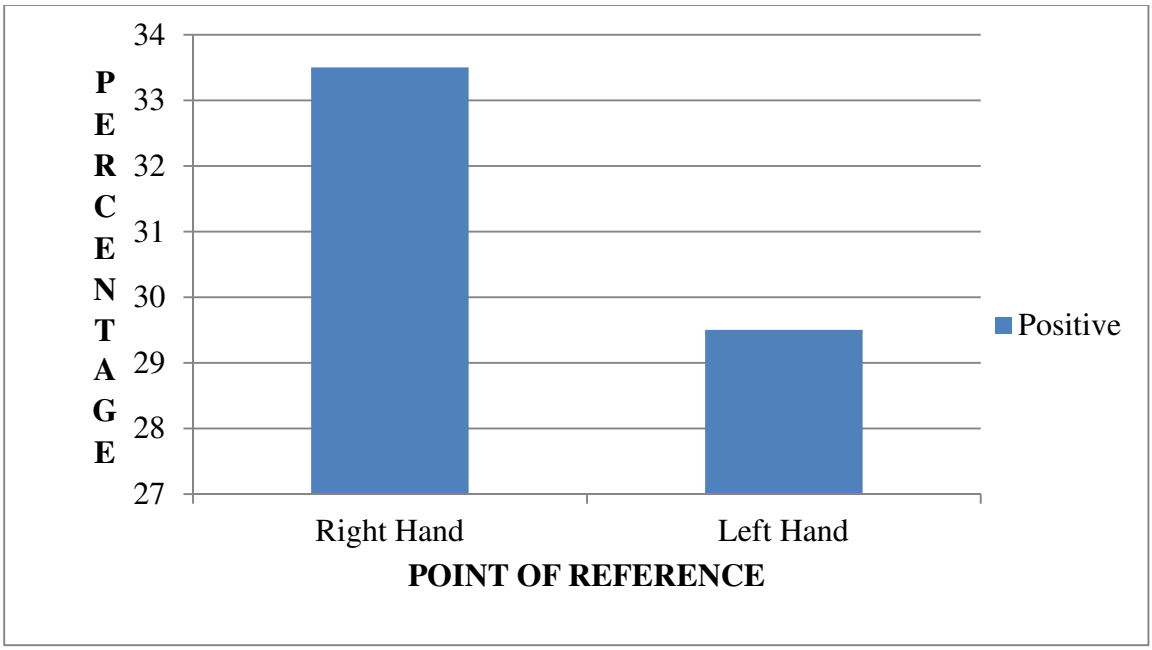

Figure 25: Bar graph illustrating participants' results of carpal tunnel syndrome post Phalens test

The above graph shows that following the Phalens test, 33.5% of participants presented with one or more symptoms of carpal tunnel syndrome in the right hand. Furthermore, 29.5% of participants presented with one or more symptoms of carpal tunnel syndrome in the left hand.

4.5.5.5. Reverse Phalens test

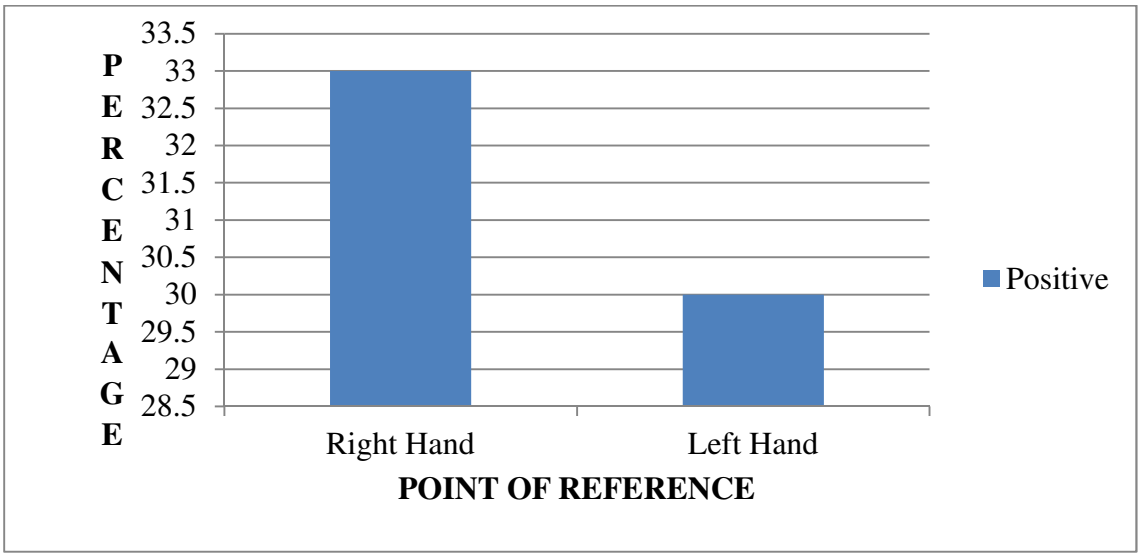

Figure 26: Bar graph illustrating participants' results of carpal tunnel syndrome post Reverse Phalens test

Figure 26 shows that following the reverse Phalens test, 33% of participants presented with one or more symptoms of carpal tunnel syndrome in the right hand. Furthermore, 30% of participants presented with one or more symptoms of carpal tunnel syndrome in the left hand.

4.5.6. De Quervains tenosynovitis

4.5.6.1. Symptoms of de Quervains tenosynovitis

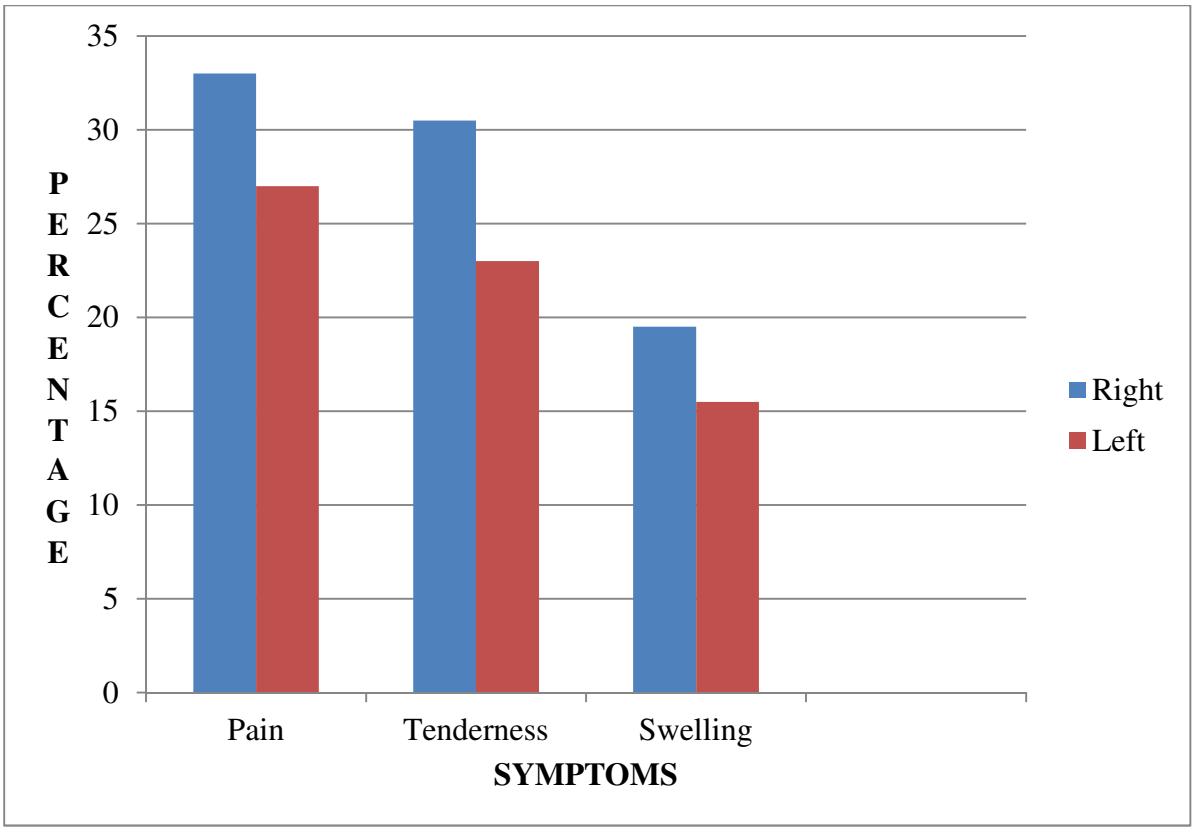

Figure 27: Bar graph illustrating participants' symptoms of de Quervains tenosynovitis

The above graph shows that 28.5% and 24.5% of participants stated that they had pain in the right and left hands respectively. Tenderness was present in 26% of participants in the right hand and 20.5% in the left hand. Eighteen and a half percent of participants reported they had swelling over the thumb side of the right wrist and 14.5% reported they had swelling over the thumb side of the left wrist. Lastly, 28.5% and 24.5% stated that they felt difficulty holding objects in their right and left hands respectively.

4.5.6.2. Symptoms post Finkelsteins test

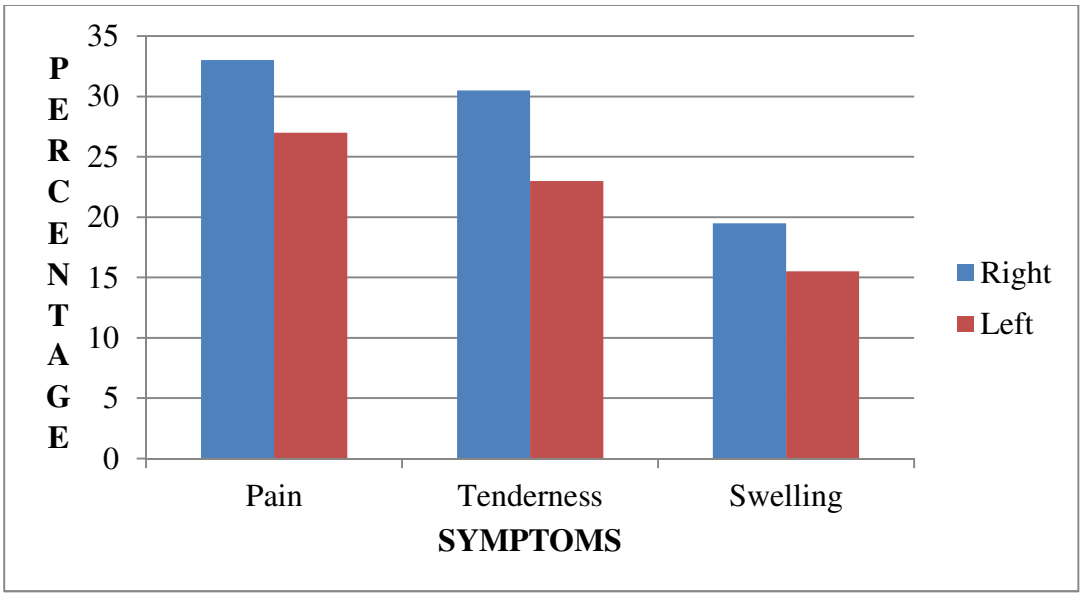

Figure 28: Bar graph illustrating participants' symptoms post Finkelsteins test

The above graph shows that 33% and 27% of participants stated that they had pain in the right and left hands respectively following the Finkelsteins test. Tenderness was present in 30.5% of participants in the right hand and 23 % in the left hand. Nineteen and a half percent of participants reported they had swelling over the thumb side of the right wrist and 15.5% reported they had swelling over the thumb side of the left wrist.

4.5.6.3. Finkelsteins test

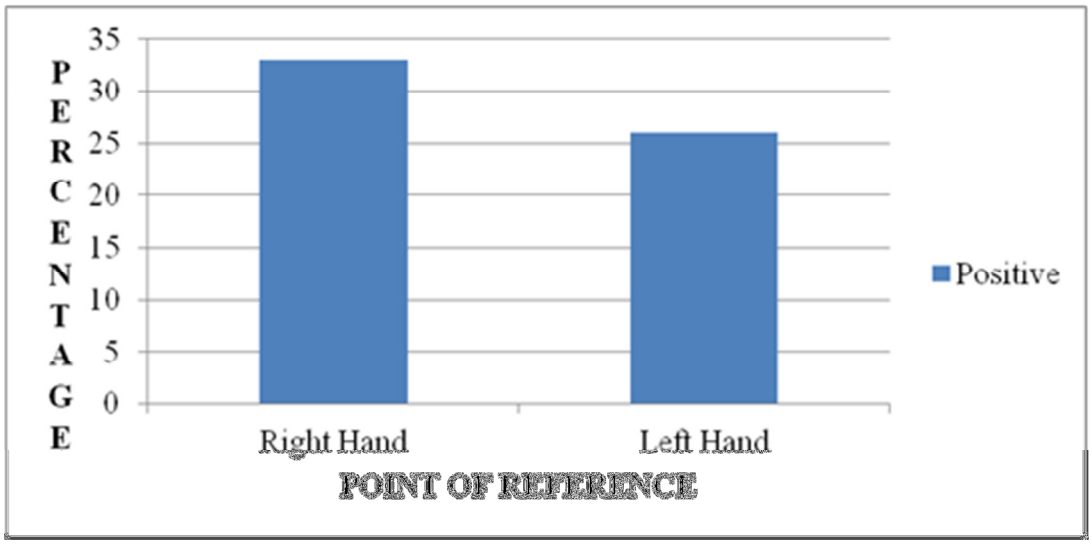

Figure 29: Bar graph illustrating participants results of de Quervains tenosynovitis post Finkelsteins test

The above graph shows that following the Finkelsteins test, 33% of participants presented with one or more symptoms of de Quervains tenosynovitis in the right hand. Furthermore, 27% of participants presented with one or more symptoms of de Quervains tenosynovitis in the left hand.

4.5.6.4 Bilateral carpal tunnel syndrome and de Quervains tenosynovitis

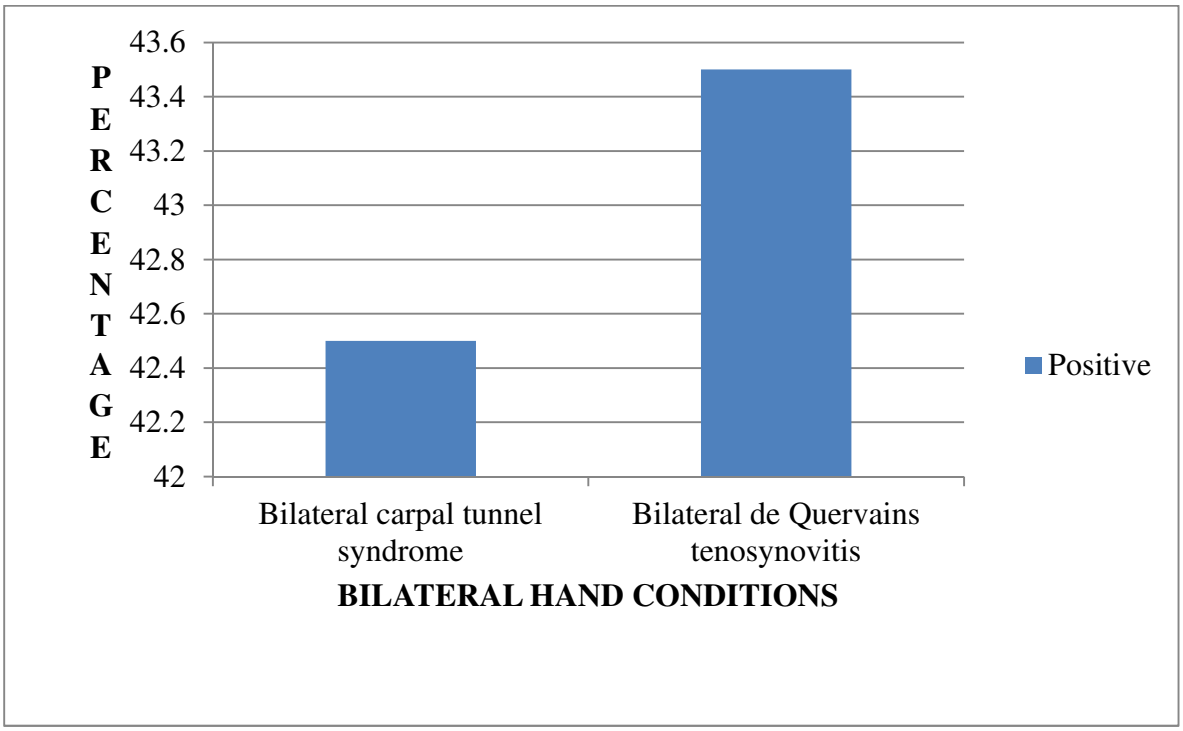

Figure 30: Bar graph illustrating participants results of bilateral carpal tunnel syndrome and de Quervains tenosynovitis

The above graph shows that 42.5% of participants presented with bilateral carpal tunnel syndrome and 43.5% of participants presented with bilateral de Quervains tenosynovitis.

4.5.6.5. Carpal tunnel syndrome and de Quervains tenosynovitis

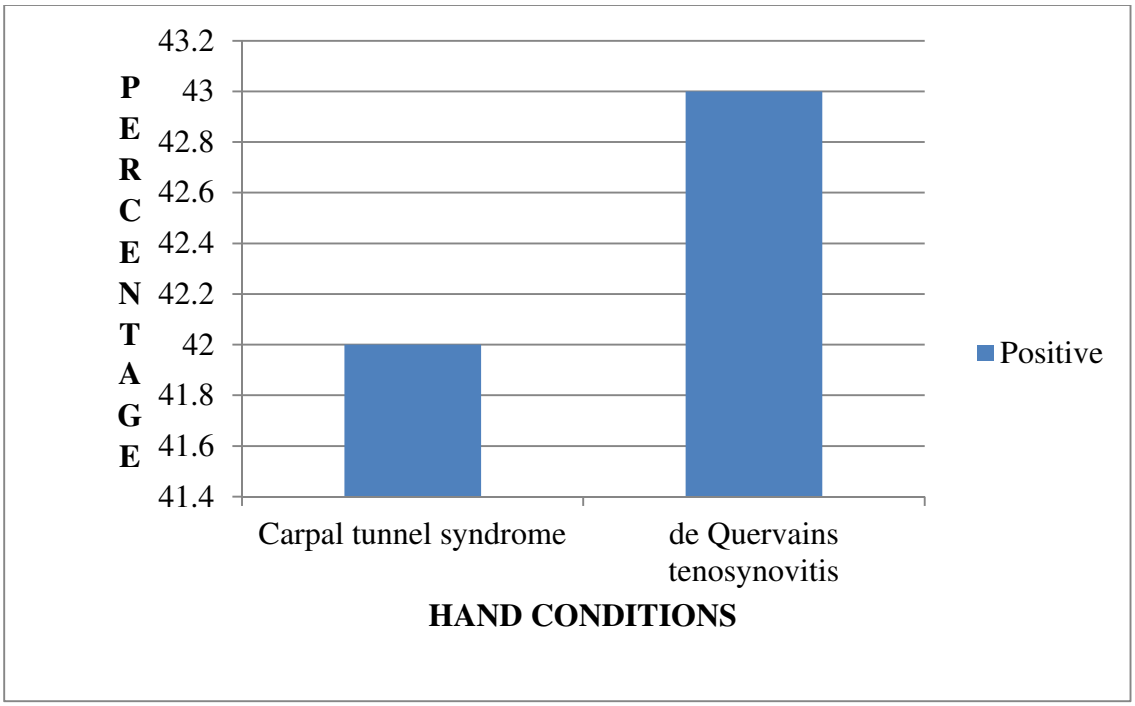

Figure 31: Bar graph illustrating participants' results of carpal tunnel syndrome and de Quervains tenosynovitis

The above graph shows that 42% of participants presented with carpal tunnel syndrome and 43% of participants presented with de Quervains tenosynovitis. The prevalence of carpal tunnel syndrome and de Quervains tenosynovitis among garment workers in the eThekwini district of Kwa-Zulu Natal was compared to the prevalence of carpal tunnel syndrome and de Quervains tenosynovitis in the United States of America using Binomial testing and it reflected that they were significantly different.

Chapter 5

Discussion

This study showed that signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis were prevalent in garment workers from the selected factories in the eThekwini district of Kwa-Zulu Natal. According to Concannon et al. (2000), carpal tunnel syndrome is the most common nerve compression disorder of the upper extremity. Carpal tunnel syndrome affects 1% of the general American population and 5% of the working population who are subjected to repetitive use of their hands and wrists in daily living (Concannon et al. 2000). According to Foye (2010), de Quervains tenosynovitis is relatively prevalent, especially among individuals who perform repetitive activities using their hands, for example, certain assembly line workers, secretaries, etc. The United States Survey of Occupational Injuries and Illnesses stated that injuries resulting from repetitive motion are growing and recent statistics have shown that over 302 000 cumulative trauma disorders account for nearly two-thirds of workplace-related illnesses.

From this study participants stated that they present with signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. The results of this study indicate that 59% of participants presented with signs and symptoms of de Quervains tenosynovitis and 63% of participants presented with signs and symptoms of carpal tunnel syndrome. The prevalence of carpal tunnel syndrome, 42%and de Quervains tenosynovitis, 43% in the eThekwini district of Kwa-Zulu Natal was compared to the prevalence of carpal tunnel syndrome and de Quervains tenosynovitis in the United States of America using Binomial testing and it reflected that they were significantly different. The motive for the significant difference stated above is probably due to the comparison of the percentages of the general and working American population according to Concannon et al. (2000), to this study population of 200 garment workers. The prevalence of these results are probably due to the constant repetitive work that these garment workers are involved in on a daily basis with minimal rest time during a working day which is in keeping with O'Neil et al. (2001) who stated that repetitive strain injuries are a result of repeated stress to the body's soft tissue structures including muscles, tendons and nerves. O'Neil et al. (2001) furthermore stated that these repetitive strain injuries often occur in patients who perform occupational repetitive movements.

5.1. Socio-demographic characteristics of the participants

Carpal tunnel syndrome is five times more common in women than in men (National Institute of Health, 2002). It usually occurs in women between the ages 30 to 60 and poses a serious occupational health hazard. Assembly line workers, packers and people who repeatedly use poorly designed tools are most frequently likely to develop this disorder. Any strenuous use of the hands – sustained grasping, twisting or flexing aggravates this condition (National Institute of Health, 2002). Whites are probably at highest risk of developing carpal tunnel syndrome (CTS). The syndrome appears to be very rare in some racial groups. More research needs to be conducted in order to suggest the reason for the high risk of carpal tunnel syndrome in whites. In North America, white United States Navy personnel have carpal tunnel syndrome at a rate of 2-3 times that of black personnel (Ashworth, 2008). This is probably because their occupations included aviation-support with equipment, engine duties, hull-maintenance duties, boatswains and machinists, all of which require direct constant force and strength as well as is in a vibratory capacity.

De Quervains tenosynovitis is a condition that primarily occurs in females aged 30 to 50 years (Levesque, 2009). Wolf et al. (2009) stated in a study on the incidence of de Quervains tenosynovitis in a young, active population that, de Quervains tenosynovitis is thought to occur most frequently in women, with presentation of pain and swelling in the first dorsal extensor sheath. They evaluated the incidence and demographic risk factors for de Quervains tenosynovitis using a large database of military personnel. There were 11,332 cases of de Quervains tenosynovitis in the population at risk of 12,117,749 person-years. Women had a significantly higher rate of de Quervains tenosynovitis at 2.8 cases per 1000 person-years, compared to men at 0.6 per 1000 person-years. Age greater than 40 was also a significant risk factor, with this age category showing a rate of 2.0 per 1000 person-years compared to 0.6 per 1000 in personnel below 20 years. There was also a racial difference, with blacks affected at 1.3 per 1000 person-years compared to the white population at 0.8.

In this study among garment workers, it became evident that because a larger percentage of females participated in the study hence more females than males presented with carpal tunnel syndrome and de Quervains tenosynovitis. Furthermore, a higher percentage of carpal tunnel syndrome and de Quervains tenosynovitis was present in the African population and this is probably because garment workers in this study population consisted of a greater number of the African population. Those participants who were married also presented with carpal

tunnel syndrome and de Quervains tenosynovitis as opposed to the single, divorced, widowed and those living with a partner. This could probably be due to married woman being employed and performing household duties more frequently than participants who were single, divorced, widowed or living with a partner. However, this study has showed no association between carpal tunnel syndrome and de Quervains tenosynovitis to marital status. The reason for this could be that in all probability a larger number of garment workers participating in this study could show an association between marital status and these two hand conditions. Cooking, baking and sewing which often require repetitive work were indicated by more than 22.5% of the participants as their hobbies. The repetitive movements of these activities on a regular basis could result in these hand conditions. A small number, 9% of participants reported playing various sport such as soccer, netball, cricket, jogging volleyball and karate on a daily or weekly basis. There was no association between these activities and carpal tunnel syndrome or de Quervains tenosynovitis. The reason for this could be that there were an abundance of various hobbies stated by participants and therefore specific hobbies related to repetitive hand use should be further studied in order to show an association.

Machinists made up most of the population in this study and this is probably due to factories requiring more machinists than other garment workers for production motives and this showed that more machinists presented with carpal tunnel syndrome and de Quervains tenosynovitis as opposed to participants involved in other roles of manufacturing the garment. This could be as a result of machinists being required to work at fast paces in unsupported or fixed postures for long periods of time. Their work entailed repetitive tasks with forceful movements involving vibration caused by the machines used to manufacture garments. The pressure put on garment workers for manufacturing of garments as well as inadequate recovery time are also possible causes of carpal tunnel syndrome and de Quervains tenosynovitis.

5.2. Prevalence of signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis

Paresthesias, pain, numbness or tingling in the palmar surface of the hand in the distribution of the median nerve are the most common symptoms of carpal tunnel syndrome and de Quervains tenosynovitis (Brotzman and Wilk, 1999). This study has shown that for carpal tunnel syndrome, 22.5% and 19.5% of participants stated they had a burning feeling in the

right and left hands respectively. Participants reported the presence of these signs and symptoms in one or both hands. This study has shown that participants reported signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. Following the Phalens, Reverse Phalens and Finkelsteins tests, a considerable percentage of participants presented with these signs and symptoms. This is probably due to participants' repetitive use of their hands.

Participants were questioned about pain in their hands at rest and during activity. They also plotted their pattern of pain on a hand chart. While 4% of participants stated they had pain at rest between 5 and 8 on the visual analogue scale in their right hand, another 4% had pain at rest in the left hand between 2 and 8 on the visual analogue scale. In addition 50.5% had pain in their left hand during activity between 2 and 10 on the visual analogue scale and 45% indicated pain in the left hand during activity between 2 and 10 on the visual analogue scale. A large percentage of participants stated that pain was present in the thumb and wrist bilaterally on the anterior and posterior aspect. This suggests that participants did present with signs of hand pathology before the specific tests were even performed. Participants were also questioned on the location of their pain which was indicative of that area being affected.

Sensation is an important part of acknowledging every part of the human body. Fine touch was assessed in this study to determine if participants presented with diminished sensation. The study showed that 4.5% and 4% had diminished sensation in the right and left anterior forearm respectively. Another 6% presented with diminished sensation to the right and left anterior thumb. An additional 4.5% also presented with diminished sensation to the right and left index and middle fingers whilst only 1% had diminished sensation in the right and left ring and middle fingers. While the percentage was not large, it is significant in the fact that many participants could not understand the concept of the entire process. From this, one can deduce that having diminished sensation places one at risk of further injury. Range of movement was tested at the wrist, thumb metacarpal phalangeal and interphalangeal joints. None of the participants presented with decreased range of movement at this stage. The reason for this could be that participants' who presented with these conditions are probably in the early stages of these hand conditions.

The National Institute of Health (2002) stated that many clinicians use specific tests like the Phalens, Reverse Phalens and Tinels tests to diagnose carpal tunnel syndrome. In de Quervains tenosynovits, the Finkelsteins test is used to diagnose the disorder. In this study the

Phalens and Reverse Phalens test was used to determine if participants presented with signs and symptoms of carpal tunnel syndrome. Results from the Phalens test showed that participants presented with a burning feeling in the hands following the Phalens test. Tingling, itching and numbness were also present. Furthermore, following the Reverse Phalens test also reproduced symptoms of carpal tunnel syndrome. This is indicative of the presence of carpal tunnel syndrome as these are tests that are used in clinical practice to assess if patients have these conditions. After the Finkelsteins test was performed, 33% and 27% of participants stated that they had pain in the right and left hands respectively. Tenderness was present in 30.5% of participants in the right hand and 23% in the left hand. Nineteen and a half percent of participants reported they had swelling over the thumb side of the right wrist and 15.5% reported they had swelling over the thumb side of the left wrist. The presence of these symptoms could indicate nerve compression and the presence of carpal tunnel syndrome and de Quervains tenosynovitis.

Many repetitive overuse injuries take place in the workplace and are most commonly seen in the hand, wrist, shoulder, and spine. The United States Bureau of Labour estimates that the incidence of repetitive overuse injuries is dramatically increasing and now accounts for 50% of all work-related ailments. From this study, many participants presented with signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis thus suggesting the presence of these repetitive hand conditions. More importantly 42.5% of participants presented with bilateral carpal tunnel syndrome and 43.5% of participants presented with bilateral de Quervains tenosynovitis. It also became evident that the prevalence of signs and symptoms of carpal tunnel syndrome, 63%, was slightly more elevated in garment workers than in de Quervains tenosynovitis 59%. The above results are probably because these garment workers' duties involved constant repetitive strain on their hands for more than 6 hours per day with inadequate rest to allow joints and structures to recover from the workload. In addition, many garment procedures requires the use of both hands and many participants have been working in the garment industry for 10 years and over and this is in all probability the reason for the results of the large percentage of garment workers presenting with bilateral hand conditions. No or minimal formal training given to garment workers on their respective duties could also contribute to the prevalence of these hand conditions as proper handling techniques, correct postures and the use of equipment may assist garment workers in adopting safe and healthy working environment.

5.3. External Risk Factors

The Occupational Safety and Health Administration (2000) indicated that the key factors which usually attributed to repetitive overuse injuries were repetition or prolonged use, force directly applied to surrounding structures of the hand as well as unsupported, uncomfortable postures. Prolonged use combined with applied force can cause micro-trauma, resulting in inflammation and injury. Inappropriate postures, poor work station and equipment design, and improper work technique can lead to muscle imbalances. Additional hazards, such as vibration and exposure to the cold, must always be considered as well. In this study 59.5% of participants produced more than ninety garments per hour. In addition, 100% of participants stated that they worked under the following conditions, applying weight through the arms, repeated movements, working with arms in unsupported positions, fast hand movements and holding or grasping objects for more than 2 hours. Lastly, 72.5% of participants stated that their work entailed using vibratory tools for prolonged hours. These large percentages stated by participants could probably be contributory factors to carpal tunnel syndrome and de Quervains tenosynovitis. However, there was no association between garment workers who hold or grasp objects for more than 2 hours or use of vibratory tools to de Quervains tenosynovitis or carpal tunnel syndrome which is conflicting to Leclerc et al. (1998) who stated that different dimensions of exposure to physical workload are widely recognised as risk factors. These risk factors include rapid hand motions, repetitive bending and twisting of the hands and the wrist, fast work pace, repetitive grasping with the fingers, mechanical stress at the base of the palm and the palm and the use of vibratory tools (Leclerc et al. 1998). A possible association could perhaps be indicated if a greater number of garment workers were selected for the study.

Parimalam et al. (2006) conducted a study in 18 garment manufacturing units located in Madurai city. A total of 216 workers from these 18 garment manufacturing units formed the study sample. Various methods like interviewing the workers; analysis of work environment; hazard identification and risk assessment and quantification techniques were used to collect information about the work, work environment and workers' health problems. By the combination of these techniques, several gaps were identified in the work environment and facilities provided to the workers. In this study, participants were questioned on health and safety in their workplace. Majority stated that no health and safety information was given to them. The majority of participants that indicated they were given health and safety

information stated that the information included cleanliness, hygiene, use of protective wear, presence of exit doors and fires. There was no association between health and safety information being given to participants or having a health and safety representative on site to carpal tunnel syndrome or de Quervains tenosynovitis. In order for a possible relationship to exist between health and safety and carpal tunnel syndrome or de Quervains tenosynovitis, probably further studies need to be conducted that are specific to health and safety in a greater number of garment workers. Additionally many factories are no longer linked to the Bargaining Council due to the high tariffs payable by factory owners to the council. Factory owners in all probability are unable to afford the services of health and safety representatives thus no information is offered to these garment workers. The importance of a health and safety representative and information is of high importance to these participants as they are exposed to vibratory machinery on a daily basis which is a source of injury or cause repetitive hand conditions according to Leclerc et al. (1998) and the purpose of health and safety information is to ensure that all garment workers have appropriate insight into their duties as well as their surroundings which is clearly lacking among the garment workers in this study population.

The Occupational Safety and Health Administration (2000) pointed out that musculoskeletal disorders affect workers in almost every industry in the world and in workplaces of all sizes. The disorders occur most frequently in jobs that involve manual handling, manufacturing and production, heavy lifting, twisting movements and long hours of working in awkward positions. Participants were questioned on their level of education, training experience and employment history. The relevance of level of education in this study indicated that many garment workers had no formal training or information on the duties that they performed. The techniques of their tasks were taught to them by other garment workers performing similar duties in great reference to completing the task regardless of the approach to it. This could be the reason for increasing statistics in occupational repetitive strain injuries. Furthermore, thirty nine percent of participants worked in their positions for 10 to 20 years while 27% and 22% worked for 5 to 10 years and 1 to 5 years respectively. Ten percent worked for more than twenty years in their respective positions. There has been no relationship between the length of time worked by garment workers to carpal tunnel syndrome or de Quervains tenosynovitis in this study which is inconsistent to the data indicated by the Occupational Safety and Health Administration, 2000. It was stated that the length of time that manual workers spend in their occupations without proper training could in all probability be

potential risk factors for the prevalence of these repetitive strain disorders (Occupational Safety and Health Administration, 2000).

The epidemiological literature indicates that the greater the level of exposure to a single risk factor or combination of factors leads to a greater the risk of having a work related musculoskeletal disorder. The literature also indicates that an important factor is the time between each episode of exposure. With adequate time to recover or adapt, and particularly when lower forces are involved, there may be less harm to the body from repeated exposures. The intensity as well as the extended length of the exposure to forceful, repetitive work plays a substantial role in the risk of work related musculoskeletal disorders in many traditional occupational settings (The Occupational Safety and Health Administration, 2000).This study showed that that 80% of participants worked an 8 hour shift whilst 14% worked 7 hours, 5% worked 9 hours and 1% worked 10 hours. Furthermore, 81% of participants worked for 2-2.5 hours before a break. For the mid-morning session, 70.5% of participants worked 2 – 2.5 hours and 29.5% worked 2.5 – 3 hours before a break. During the afternoon session 75.3% of participants worked 1 – 1.5 hours and 10.5% worked 1.5 – 2 hours before a break. The long hours that participants work with their small amount of breaks and under the following conditions stated above could lead to conditions like carpal tunnel syndrome and de Quervains tenosynovitis. The Occupational Safety and Health Administration, (2000) has contributed that inadequate recovery time due to lack of breaks and failure to vary tasks may leave insufficient time for tissue repair which are likely to cause musculoskeletal problems.

5.4. Functional Limitations When Performing Certain Activities of Daily Living

According to studies done in Canada in 2000 and 2001, one out of every ten Canadian adults had a repetitive strain injury serious enough to limit their activities (Concannon et al. 2000). In this study, two tables were drawn up to determine if participants had difficulty performing certain activities of daily living. These activities were specific to carpal tunnel syndrome and de Quervains tenosynovitis. Even though majority of the participants could perform asks with no discomfort, a small percentage were restricted due to discomfort. A small percentage was also unable to perform certain activities of daily living. These activities of daily living become difficult for some garment workers to perform especially if they have no assistance in their households. Garment workers are exposed to risk factors that lead to musculoskeletal disorders. Factors that are the leading causes of musculoskeletal disorder problems are exerting excessive force, excessive repetition of hand movements, inappropriate postures,

unsupported positions that a worker must hold for long periods, increased speed or acceleration, grasping of sharp edges or handles or excessive vibration from machines. These risk factors either alone or in combination can subject a worker's shoulders, arms, hands, wrists, back and legs to thousands of repetitive twisting, forceful or flexing motions during a typical workday (The Occupational Safety and Health Administration, 2000).

Participants were very interested in this study so as to discover if they presented with signs and symptoms of carpal tunnel syndrome or de Quervains tenosynovitis. Although it was distressing that none of the participants had heard of these conditions before or "never knew it existed," however the information sheet on the conditions and the exercises that were given to all participants as a form of education and awareness. For most of them it was a starting point to learning and discovering the value of their hands as well as how to care for them. For the rest, it was a start to becoming aware of the various facets of their occupation and to encourage adopting a safe and healthy lifestyle.

Chapter 6

Conclusion, Limitations and Recommendations

6.1. Introduction

In this final chapter, details of the major issues in this study are given in the conclusion and thereafter some recommendations are proposed at the end of the chapter.

6.2. Conclusion

This study has identified the prevalence of signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis among garment workers. It has also shown that a significant percentage of garment workers presented with typical signs and symptoms of carpal tunnel syndrome and de Quervains tenosynovitis. Furthermore, there was a higher prevalence of carpal tunnel syndrome (63%) than de Quervains tenosynovitis (59%) in garment workers. In addition, this study has identified possible risk factors that contribute to these conditions. These risk factors include unsupported and uncomfortable postures, constant repetition of movements, constant vibration and static postures. It was also found that a considerable percentage of garment workers presented with functional limitations when performing certain activities of daily living, like, writing, bathing, carrying grocery bags, holding a glass of water and turning a key in a lock. All participants were given hand-outs as education, consisting of information and a list of exercises for carpal tunnel syndrome and de Quervains tenosynovitis. These hand-outs will assist these garment workers in becoming aware of these conditions and help prevent hand injury. The hand-outs also aim to promote a safe, pain free and healthy environment.

6.3. Limitations

Limitations to this study included a small number of factories being chosen for this study. Only one district was selected. Garment factories located in rural areas were not included in this study. Time constraints were a factor as each participant was given half an hour per questionnaire which was insufficient. Participants tired easily as there was two parts to the study. Factory owners refused to allow more time for participants to be interviewed as it collided with production time. Collecting data at the end of the year also posed as a limitation as time factor for factories at this part of the year is limited due to the haste of shut down for the festive season. It appeared to the researcher that many participants were afraid to answer

questions that included indicating present medical problems or medication as they were probably fearful of being informed that they were unfit for duty. Participants were involved in a variety of jobs (all participants did not perform the same duty), hence this could account for the results not being statistically significant in this study.

6.4. Recommendations for further studies

The following recommendations are suggested based on the findings of the study:

A larger number of factories from more districts with more garment workers should be included in future studies. Considering that urban areas were used, it is recommended that the prevalence of signs and symptoms in carpal tunnel syndrome and de Quervains tenosynovitis be investigated in rural areas so further comparison can be made. A further insight into work environment and working postures is also suggested. It is also recommended that future studies involve participants performing the same occupational duties in order for improved correlation of results. If a clinical aspect of the questionnaire is also part of the study, it is recommended that the interview and the physical examination of the participants be done in a two part series as participants tire easily.

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Appendix 1a

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

SNT Fashions

69 Lorne Street (Second Floor)

Durban

4000

Attention: Miss T. Pillay

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Miss Pillay, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

This research will entail selected garment workers being requested to participate in the study by signing a consent form. Upon approval by factory owners, each worker will be asked a few questions about their work and thereafter tested for two conditions using two simple, risk free tests to clinically diagnose if they have symptoms of these injuries. The

date, time and venue will be discussed with you once authorization from you is received. All personal details of the participants and factories will be kept confidential and a summary of all data will be collaborated into a thesis. This will be available for you to review once the study has been completed.

Your co-operation and assistance will be highly appreciated in compiling this study. Please find enclosed a copy of the consent form and questionnaire regarding my study.

Yours faithfully,

Ms P. Pillay

UKZN-Westville Campus

Registration No. : 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

Physiotherapy

Tel (W): 031- 2607977

I, Miss T. Pillay acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from garment workers.

Thank you

Miss T. Pillay

26/05/2010

Date

Appendix 1b

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

Grand Uniform

27 Colombine Place

Glen Anil

4000

Attention: Mr Alvin Pillay

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Mr Pillay, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

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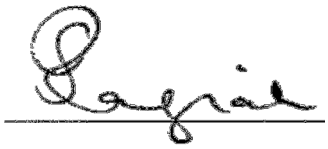
Your co-operation and assistance will be highly appreciated in compiling this study. Please find enclosed a copy of the consent form and questionnaire regarding my study.

Yours faith



Ms P. Pillay

UKZN-Westville Campus

Registration No. : 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

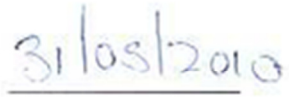
Physiotherapy

Tel (W): 031- 2607977

I, Mr A. Pillay acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from all garment workers.

Thank you

Mr A. Pillay



Date

Appendix 1c

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

Image Embroidery

625 Sunset Avenue

Woodhurst

4000

Attention: Mr A Krishandutt

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Mr Krishandutt, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

This research will entail selected garment workers being requested to participate in the study by signing a consent form. Upon approval by factory owners, each worker will be asked a few questions about their work and thereafter tested for two conditions using two simple, risk free tests to clinically diagnose if they have symptoms of these injuries. The

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Your co-operation and assistance will be highly appreciated in compiling this study. Please find enclosed a copy of the consent form and questionnaire regarding my study.

Yours faithfully,

Ms P. Pillay

UKZN-Westville Campus

Registration No. : 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

Physiotherapy

Tel (W): 031- 2607977

I, Mr A. Krishandutt acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from all garment workers.

Thank you

Mr.A. Krishandutt

26/05/2010

Date

Appendix 1d

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

HIS Clothing

69 Lorne Street (First Floor)

Durban

4000

Attention: Mr K. Ismail

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Mr K. Ismail, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

This research will entail selected garment workers being requested to participate in the study by signing a consent form. Upon approval by factory owners, each garment worker will be asked a few questions about their work and thereafter tested for two conditions using two simple, risk free tests to clinically diagnose if they have symptoms of these

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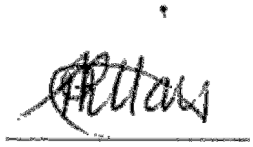
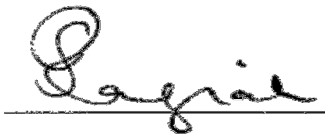
Your co-operation and assistance will be highly appreciated in compiling this study. Please find enclosed a copy of the consent form and questionnaire regarding my study.

Yours faithfully,





Ms P. Pillay

UKZN-Westville Campus

Registration No. : 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

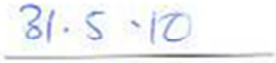
Physiotherapy

Tel (W): 031- 2607977

I, Mr K. Ismail acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from all garment workers.

Thank you

Mr K. Ismail



Date

Appendix 1e

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

TCS Cutting Services

44 Lorne Street

Durban

4000

Attention: Mr F. Sarkhot

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Mr Sarkhot, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

This research will entail selected garment workers being requested to participate in the study by signing a consent form. Upon approval by factory owners, each garment worker will be asked a few questions about their work and thereafter tested for two conditions using two simple, risk free tests to clinically diagnose if they have symptoms of these

injuries. The date, time and venue will be discussed with you once authorization from you is received. All personal details of the participants and factories will be kept confidential and a summary of all data will be collaborated into a thesis. This will be available for you to review once the study has been completed.

Your co-operation and assistance will be highly appreciated in compiling this study. Please find enclosed a copy of the consent form and questionnaire regarding my study.

Yours faithfully,

Ms P. Pillay

UKZN-Westville Campus

Registration No.: 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

Physiotherapy

Tel (W): 031- 2607977

I, Mr F. Sarkhot acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from all garment workers.

Thank you

Mr F. Sarkhot

31. 05. 2010

Date

Appendix 1f

26 April 2010

4 Hylo Circle

Parlock

Durban

4037

RS Fashions

69 Lorne Street (Third Floor)

Durban

4000

Attention: Mr S. Govender

RE: RESEARCH FOR MASTER'S DEGREE IN HAND REHABILITATION

My name is Prabashni Pillay. I am a Master's in Hand Rehabilitation student at the University of Kwa-Zulu Natal. In order to complete my degree it is imperative that I undertake a research project within a year. Your assistance is required.

Mr Govender, from my literature search it is evident that repetitive strain injuries of the hands are increasing worldwide. Evidence has shown that some conditions due to repetitive strain injury, if diagnosed early can be treated by therapy in the form of rehabilitation. I request your permission to visit your factory to collect data and gain knowledge on the prevalence of garment workers presenting with symptoms of two repetitive strain disorders and possible risks thereof.

This research will entail selected garment workers being requested to participate in the study by signing a consent form. Upon approval by factory owners, each garment worker will be asked a few questions about their work and thereafter tested for two conditions using two simple, risk free tests to clinically diagnose if they have symptoms of these

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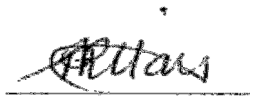
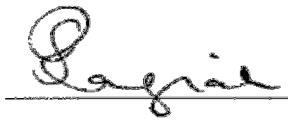
Yours faithfully,





Ms P. Pillay

UKZN-Westville Campus

Registration No.: 200204300

Cell: 0848181846

Tel (H): 031 – 5771897

Mrs P. Rangiah

Research Supervisor -

Physiotherapy

Tel (W): 031- 2607977

I, Mr S. Govender acknowledge receipt of requisition by Miss Prabashni Pillay to undertake her research thesis in my factory premises. Permission is granted to Miss Prabashni Pillay to undertake her research at my factory with written consent from all garment workers.

Thank you

Mr S. Govender

Date

Appendix 2a

CONSENT FORM

The purpose of this study is to find out how many garment workers present with signs and symptoms of two common hand problems. This study will also allow the researcher to identify factors that might put the garment worker at risk of developing hand problems. Garment workers from different factories have been invited to take part in this study. Permission has been obtained from the factory manager for workers to participate. The researcher will interview you by asking you a few questions about your general health and the type and amount of work that you do. Thereafter you will be asked to perform exercises to find out if you present with signs symptoms of two common hand conditions.

The researcher will show you each exercise and you will state what you feel after 1 minute of performing the exercise. It will take approximately 30 minutes to carry out. The researcher will give you an information booklet that explains what you could do to prevent hand problems. The booklet is made up of advice and exercises for you to use as a home exercise program. If it is found that you do have signs and symptoms of hand problems then the researcher will refer you to a medical professional. The risks are minimal. If you experience any discomfort during or after performing the exercises, do not be alarmed as this is temporary in nature. The study will be conducted in a room already set up by the researcher. You will be seated in a quiet, private and comfortable room in your factory.

Your name and any information which might identify you will be kept confidential. This will be done by placing the questionnaires in a locked cabinet. Each questionnaire will only have a reference number on it. Only the researcher and supervisor will have access to the information. Any information gained from this study will be grouped with data from other subjects so that you cannot be identified.

Your participation in this study is entirely voluntary and therefore, you may withdraw from the study at any time. However, your participation in the study will help in identifying the proportion of garment workers presenting with symptoms of these conditions. If you have any questions regarding this study please feel free to contact the researcher or the supervisor on the following numbers:

Miss P. Pillay – 0848181846 (researcher) or Mrs P. Rangiah – 0845973196 (supervisor)

Your signature indicates that you have read the above information, that you have no questions regarding the study and that you freely volunteer to participate in the study.

_____ _____

Subject's signature Date

_____

Witness' signature

Appendix 2b

IMVUME

Inhloso yalesisifundo ukuthola ukuthi bangaki abasebenzi abathunga izingubo abanezimpawu zokuguliswa izandla. Lesisifundo sizosiza umfundisi ukuthi akwazi ukuthola izinto ezingenza ukuthi yini engaba ingozi kubantu abathunga izingubo engenza baphalhwe inking yezandla. Abathunga izingubo abaqhamuka kuma factory ahlukene baceliwe ukuthi babeyinxenye yalesisifundo. Imvume itholiwe kumphathi wefactory ukuthi abasebenzi babeyinxenye yalesisifundo. Umfindisi uzobuza imibuzo kubantu abazobe beyinxenye yesifundo mayelana nempilo yabo kanye nokuthi imuphi umsebenzi abawenzayo, nokuthi mungakanani. Emva kwalokho uzobe usucelwa ukuthi wenze ukunyakaziswa kwesandla ukuze sithole ukuthi bukhona yini ubuhlungu obuzwayo ezandleni, noma izimpawu zobuhlungu ezandleni zakho.

Umfundisi uzokukhomisa ukuthi kunele wenzenjani uma uzilul noma unyakazisa isandla, uzosho ukuthi uzizwa unjani emumva kwe minithi uzilulile. Kuzothatha u 30 minithi ulokhu uqhubeka. Umfundisi uzokunika ibhuku elibhalwe ngencazelo ezokusiza ukuthi wazi ukuthi wenzenjani ukuvikela ezinkingeni ezizokusiza, ungathola nokuthi kunele u exercise ukunyakazisa noma ukulula isandla ukuze ukwazi ukusebenzisa lokhukulula kwesandla ekhaya. Uma kutholakala ukuthi unayo inking yesandla, umfundisi uzokuthumela kudokotela. Ubungozi buncane. Uma uthola ukuthi awaneliseki uma wenza noma sekwedlulile ukulula isandla, ungathuki lokhu knucane.Isifundo sizokwenziwa endlini ezobe isilungile ilungiswe umfundisi. Uzohlala endlini ethule, yakho wedwa ezozwana e efactory yakho.

Igama lakho noma imininingwane ngawe izoba imfihlo. Ngokuthi yonke imibuzo ezovalelwa endaweni ephephile.Imibuzo izoba nenamba ezobe ichaza ukuthi eyani. Kuzoba umfundisi nomphathi wakhe kuphela ozobe enemvume yokuba nale mniningwane. Bonke ulwazi obuzotholakala kulesisifundo buzohlanganiswa nobunye ukuze kungazeki ukuthi obakho.

Ukuba ubenathi kuzoba ukuthanda kwakho, uma uthanda ukuyeka ungayeka noma inini. Ukuba nathi kungasiza ukuze sazi ukuthi bangaki abathungi bezingubo abanalenkinga. Uma unemimuzo ungasabi ukubuza umfundisi noma umphathi wakhe.

Inumber zocingo: Miss P. Pillay – 0848181846

Mrs P. Rangiah - 0845973196

Ukusayina kuchaza ukuthi ukufundile lokhu okubhalwe ngaphezulu, nokuthi awunayo imibuzo emayelana nalesisifundo, nokuthi uyathanda ukuba kanye nathi kulesisifundo

_____ _____

Sayina igama lakho Usuku

_____

Kuzosayina uzokusupporter

Appendix 3a

QUESTIONNAIRE FOR GARMENT WORKERS

INSTRUCTIONS:

This is a researcher administered questionnaire. A tick (✓) is to be placed in the appropriate block(s) OR by referring to the specific instructions provided with certain questions.

PART 1 DATE: _____ REFERENCE NO. _____

SECTION A: BACKGROUND INFORMATION

1. Age _____ (years)

2. Sex

MALE	
FEMALE	

3. Population Group

AFRICAN	
INDIAN	
COLOURED	
WHITE	
OTHER	

If other, please specify _____

4. Marital Status

SINGLE	
MARRIED	
DIVORCED	
WIDOWED	
LIVING WITH A PARTNER	

5. What are your hobbies? _____

6. Do you play any sport?

YES	
NO	

Please state what type of sport? _____

How often do you play? _____

7. Which hand dominant are you?

RIGHT	
LEFT	

8. What is your highest level of education?

PRIMARY	
SECONDARY	
TERTIARY	
NONE	

SECTION B: PRESENT AND PAST MEDICAL HISTORY

9. Do you have any medical problems?

YES	
NO	

If yes, please state what conditions? _____

_____

10. Have you had any problems with your hands?

YES	
NO	

If yes, please state what problems? _____

11. Are you on any medication?

YES	
NO	

If yes, please state what medication? _____

SECTION C: EMPLOYMENT

12. What is your role in manufacturing the garment?

MACHINIST	
SERVICE HAND	
CLEANER	
PRESSOR	
CHECKER	
DESPATCHER	
CUTTER	
LAYER	
MARKER	
PATTERN MAKER	
OTHER	

If other, please specify? _____

13. How many years are you working in the above position? (ans. from 12)

0 – 6 MONTHS	
6 – 12 MONTHS	
1 – 5 YEARS	
5 – 10 YEARS	
10 – 20 YEARS	
> 20 YEARS	

14. What type of training did you have for this type of job?

_____

15. How many hours do you work with a break according to the following sessions?

Morning Session

Working Hours (Hours) Break (Minutes) What do you during your break?

1.	1-2	
2.	2-2.5	
3.	2.5-3	
4.	0THER	

1.	5-10	
2.	10-15	
3.	10-20	
4.	0THER	

1.	CONTINUE WORKING	
2.	EAT/DRINK	
3.	SOCIALIZE	
4.	0THER	

If other please specify _____ _____ _____

Mid-Morning Session

Working Hours (Hours) Break (Minutes) What do you during your break?

1.	1-2	
2.	2-2.5	
3.	2.5-3	
4.	0THER	

1.	10-15	
2.	15-30	
3.	30-45	
4.	0THER	

1.	CONTINUE WORKING	
2.	EAT/DRINK	
3.	SOCIALIZE	
4.	0THER	

If other please specify _____ _____ _____

Afternoon Session

Working Hours (Hours) Break (Minutes) What do you during your break?

1.	1-1.5	
2.	1.5-2	
3.	2-2.5	
4.	0THER	

1.	5-10	
2.	10-15	
3.	15-20	
4.	0THER	

1.	CONTINUE WORKING	
2.	EAT/DRINK	
3.	SOCIALIZE	
4.	0THER	

If other please specify _____ _____ _____

16. How many hours do you work per day?

6	
7	
8	
9	
10	

If other, please state how many? _____

17. How many garments do you produce per hour?

<30	
30-49	
50-69	
70-89	
>90	

18. Do you work under the following conditions?

	YES	NO
APPLYING WEIGHT THROUGH YOUR ARMS		
REPEATED MOVEMENTS		
WORKING WITH ARMS IN UNSUPPORTED POSITIONS		
FAST HAND MOVEMENTS		
HOLDING OR GRASPING FOR > 2HOURS		
USE OF VIBRATING TOOLS		

19. Do you have a health and safety representative on site?

YES	
NO	

20. Have you had any health and safety information given to you?

YES	
NO	

If yes, please specify_____

21. Do you have a nurse on site?

YES	
NO	

22. If you injure your hand, what procedure is followed?

1. I AM TAKEN TO THE NURSE ON SITE	
2. I HAVE ACCESS TO THE FIRST AID BOX IN THE FACTORY	
3. I AM RUSHED TO THE NEAREST HOSPITAL	

If other please state?_____

PART 2 (DATA SHEET)

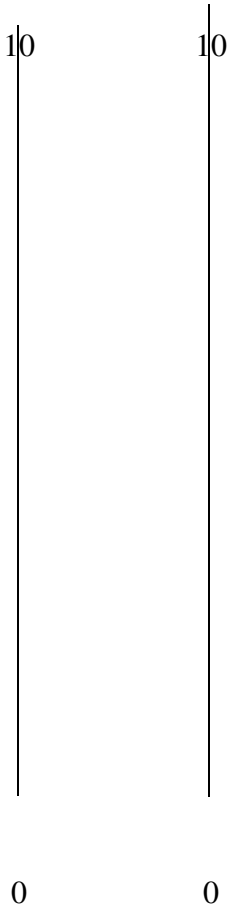
(Questions will be administered by the researcher)

SECTION E: SIGNS AND SYMPTOMS

DATE: _____

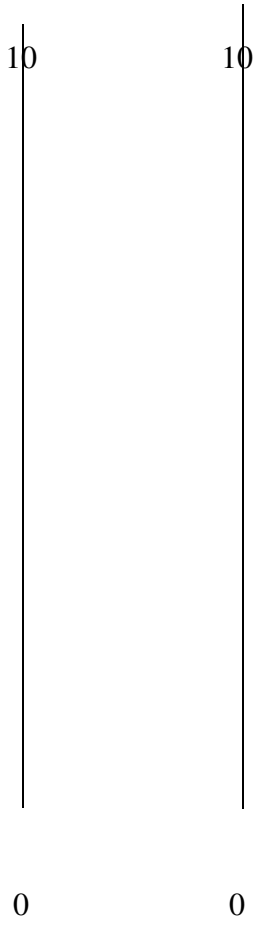
(*Questions 23 and 24 will be documented by the participant)*

23. What is your pain at rest?



RIGHT LEFT

24. What is your pain during activity?



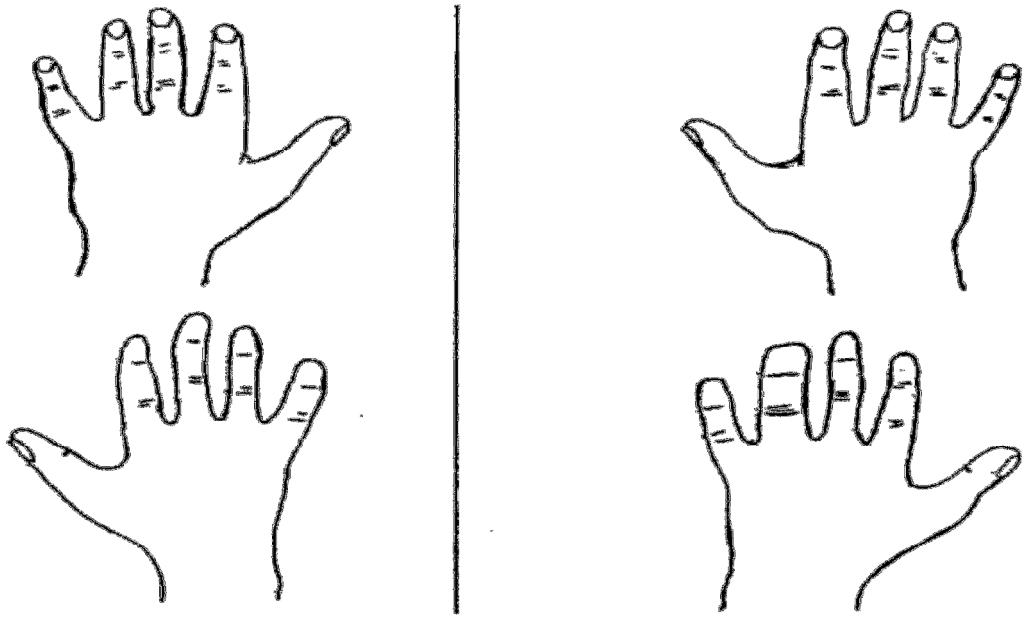
RIGHT LEFT

(Draw a line across each black line already drawn to describe your pain at rest and your pain during activity for each hand)

0 – no pain

10 - most amount of pain you feel

Please place a cross (×) on the hand chart below to show the location of your pain



LEFT RIGHT

(TOP LEFT AND RIGHT SHOWS BACK OF THE HAND)

(BOTTOM LEFT AND RIGHT SHOWS FRONT OF THE HAND)

25. Sensation Testing

AREA	INCREASED		DIMINSHED		NORMAL		ABSENT	
	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
ANTERIOR FOREARM								
ANTERIOR THUMB								
INDEX AND MIDDLE FINGER								
RING AND LITTLE FINGER								

26. Range of movement

MOVEMENTS	ACTIVE RANGE OF MOVEMENT																LIMITING FACTOR
	RIGHT				LEFT				RIGHT				LEFT				
	R1	R2	R3	AV.	R1	R2	R3	AV.	R1	R2	R3	AV.	R1	R2	R3	AV.	
WRIST: FLEXION																	
EXTENSION																	
RADIAL DEVIATION																	
ULNA DEVIATION																	
THUMB: MCP: FLEXION																	
EXTENSION																	
ABDUCTION																	
ADDUCTION																	
IP: FLEXION																	
EXTENSION																	

27. Are you able to perform the following activities? (Levine et al. 1993)

	ABLE TO WITH NO DISCOMFORT	ABLE TO WITH DISCOMFORT	ABLE TO WITH HELP FROM THE OTHER HAND	UNABLE TO PERFORM
1.WRITING				
2.BUTTONING				
3.GRIPPING THE TELEPHONE				
4.CARRYING GROCERY BAGS				
5.BATHING				
6.DRESSING				
7. HOLDING A CUP OF TEA				
8.EATING WITH A TABLESPOON				

28. Are you able to perform the following activities? (Chung et al. 1998)

	ABLE TO WITH NO DISCOMFORT	ABLE TO WITH DISCOMFORT	ABLE TO WITH HELP FROM THE OTHER HAND	UNABLE TO PERFORM
1. TURN A DOOR KNOB				
2.PICK UP A COIN				
3. HOLD A GLASS OF WATER				
4. TURN A KEY IN THE LOCK				
5. HOLD A FRYING PAN				

29. Grip Strength

	RIGHT HAND	LEFT HAND
DYNAMOMETER READING (1)		
DYNAMOMETER READING (2)		
AVERAGE (3)		

30. Have you experienced the following symptoms? (*Please tick)*

(The post-test columns are to document the presentation of symptoms once the Phalens and Reverse Phalens test is conducted)

			POST TEST (PHALENS)		POST TEST (R. PHALENS)	
SYMPTOMS	R	L	R	L	R	L
Burning in the palm of the hand and fingers						
Tingling in the palm of the hand and fingers						
Itching in the palm of the hand and fingers						
Numbness in the palm of the hand and fingers						
Feelings of a swollen and useless hand						
Difficulty holding objects						

31. Have you experienced the following symptoms?*(Please tick)*

(The post-test columns are to document the presentation of symptoms once the Finkelsteins test is conducted)

			POST TEST (FINKELSTEINS)	
SYMPTOMS	RIGHT	LEFT	RIGHT	LEFT
Pain over the thumb side of the wrist				
Tenderness over the thumb side of the wrist				

Swelling over the thumb side of the wrist				
Difficulty holding objects				

(Q32, 33 and 34 will be determined by the results in the post test column in Q30 and 31).

32. Phalens test (Hold your forearms upright pointing your fingers down towards the floor and pressing the backs of the hands together. Hold for 1 minute, thereafter, identifies symptoms). Test to be demonstrated by the researcher

	RIGHT	LEFT
POSITIVE		
NEGATIVE		

33. Reverse Phalens test (Hold your forearms upright pointing your fingers upwards towards the ceiling and pressing the palms of the hands together. Hold for 2 minutes, thereafter, identifies symptoms). Test to be demonstrated by the researcher

	RIGHT	LEFT
POSITIVE		
NEGATIVE		

34. Finkelstein's test (Hold the thumb in your palm. Make a fist and bend wrist towards floor, identify symptoms.) Test to be demonstrated by the researcher

	RIGHT	LEFT
POSITIVE		
NEGATIVE		

THANK YOU KINDLY FOR YOUR PATIENCE AND CO-OPERATION

Appendix 3b

IMIBUZO YABASEBENZI ABASEBENZA UKUTHUNGA IZINGUBO

UKUCHAZA

Lena imibuzo ebuzwa umgcwaningi. Enza ithiki(✓) endaweni efanele futhi ulandele imithetho ehambisana nemibuzo.

UHLELO LOKUQALAUSUKU: _____YI-REFERENCE: _____

UHLELO A: IMIBUZO ECHAZA UBUWENA

1. Iminyaka _____

2. Ubulili

ISILISA	
ISIFAZANE	

3. Ubuhlanga

UMZULU	
INDIYA	
IKHALADI	
UMLUNGU	
NOMA OKUNYE	

Uma ungalona uhlanga olubaliwe ngaphezulu chaza ukuthi uhlanga luni? _____

4. Ukushada

AWUSHADILE	
USHADILE	
UHLUKANISILE	
UWUMFELOKAZI	
NIHLALISENI KODWA ANISHADILE	

5. Yini oyithandayo empilweni, ekujabulisayo?

_____

6. Uyathanda ukudlala imidlalo njenge bhola?

YEBO	
CHA	

Chaza umudlalo muni owuthandayo? _____

Udlala nini noma kangaki? _____

7. Usebenzisa siphi isandla uma wenza izinto?

ESOKUDLA	
ESOKUNXELE	

8. Ugcine kabani esikoleni?

AMABANGA AMANCANE	
AMABANGA APHEZULU	
EYUNIVESI	
AWUFUNDILE	

UHLELO B: CHAZA NGOKUGULA KWAKHO KWAMANJE NOKWEDLULA

9. Ikhona into ekugulisayo?

YEBO	
CHA	

Uma uthi yebo, chaza ukuthi yini ekugulisayo? _____

_____

10. Ukewabanenkinga ngezandla zakho?

YEBO	
CHA	

Uma uthi yebo, chaza ukuthi yini inkinga? _____

11. Ikhona imithi noma amaphilisi owaphuzayo?

YEBO	
CHA	

Uma uthi yebo, isho imithi oyiphuza? _____

UHLELO C: UMQASHI

12. Uyini umsebenzi wakho la?

USEBENZISA IMISHINI	
USEBENZISA IZANDLA	
UYAKLINA	
UYAPRESA	
UYACHEKHA	
UWUDESPATCHER	
UYASIKA	
UWULAYER	
UYAMAKA	
UMENZI WAMAPHETHINI	
OKUNYE	

Umakuwokunye chaza? _____

13. Ususebenze iminyaka emingaki kulomsebenzi wakho?

IZINYANGA EZIWU 0-6	
IZINYANGA EZIWU 6-12	
UNYAKA 1-5	
IMINYAKA EWU 5-10	
IMINYAKA EWU 10 -20	
NGAPHEZULI KWEMNYAKA EWU 20	

14. Wawufundiswa kuphy umsebenzi?

_____

15. Usebenza amahora amangaki sekuhlangene nesikhathi setiye, bhala ngezansi?

Ekuseni

(Amahora)okusebenzaiBreak (Imizuzu) Wenzani ngebrakhi yakho?

1.	1-2	
2.	2-2.5	
3.	2.5-3	
4.	OKUNYE	

1.	5-10	
2.	10-15	
3.	10-20	
4.	0KUNYE	

1.	UYAQUBEKA USEBENZE	
2.	UKUDLA	
3.	UXOXE	
4.	0KUNYE	

Umakowokunye chaza _____ _____ _____

iSession yasemini

(Amahora) okusebenzaiBreak (Imizuzu) Wenzani ngebrakhi yakho?

1.	1-2	
2.	2-2.5	
3.	2.5-3	
4.	OKUNYE	

1.	5-10	
2.	10-15	
3.	10-20	
4.	0KUNYE	

1.	UYAQUBEKA USEBENZE	
2.	UKUDLA	
3.	UXOXE	
4.	0KUNYE	

Umakowokunye chaza _____ _____ _____

iSession yantambama

(Amahora) okusebenzaiBreak (Imizuzu) Wenzani ngebrakhi yakho?

1.	1-1.5	
2.	1.5-2	
3.	2-2.5	
4.	0KUNYE	

1.	5-10	
2.	10-15	
3.	15-20	
4.	0KUNYE	

1.	UYAQUBEKA USEBENZE	
2.	UKUDLA	
3.	UXOXE	
4.	0KUNYE	

Umakowokunye chaza _____ _____ _____

16. Usebenza amahora amangaki ngelanga?

6	
7	
8	
9	
10	

umakuwokunye chaza? _____

17. Wenza amagamenti amangaki ngelanga?

<30	
30-49	
50-69	
70-89	
>90	

18. Usebenza ngaphansi kwalezizimo na?

	YES	NO
UPHAKAMISE IZINTO NGEZANDLA		
WENZE INTO EYODWA UPHINDELELA		
USEBENZE UNGASEKELIWE		
USEBENZISE IZANDLA NGOKUSHESHA		
UKUBAMBA NGEZANDLE NGAPHEZULI KWAHORA AMABILI		
USEBENZISE IMISHINI EVIBRATHAYO		

19. Ukhona yini osebenza ukubheka ezempilo nobungozi la emsebenzini?

YEBO	
CHA	

20. Kukhona okufundisiwe ngezempilo nokuvikeleka?

YEBO	
CHA	

Uma uthi yebo chaza_____

21. Ukhona um'hlengikazi la emsebenzini?

YEBO	
CHA	

22. Uma ulimala isandla ulandela miphi imigomo?

1. NGIBONANA NOMHLENGIKAZI	
2. NGINEMVUMO YOKUSEBENZISA IBHOKISI LEFIRST AID	
3. NGIPHUNYISWA ESIBHEDLELA	

Umakuwokunye chaza? _____

UHLELO LWESIBILI 2

IMIBUZO

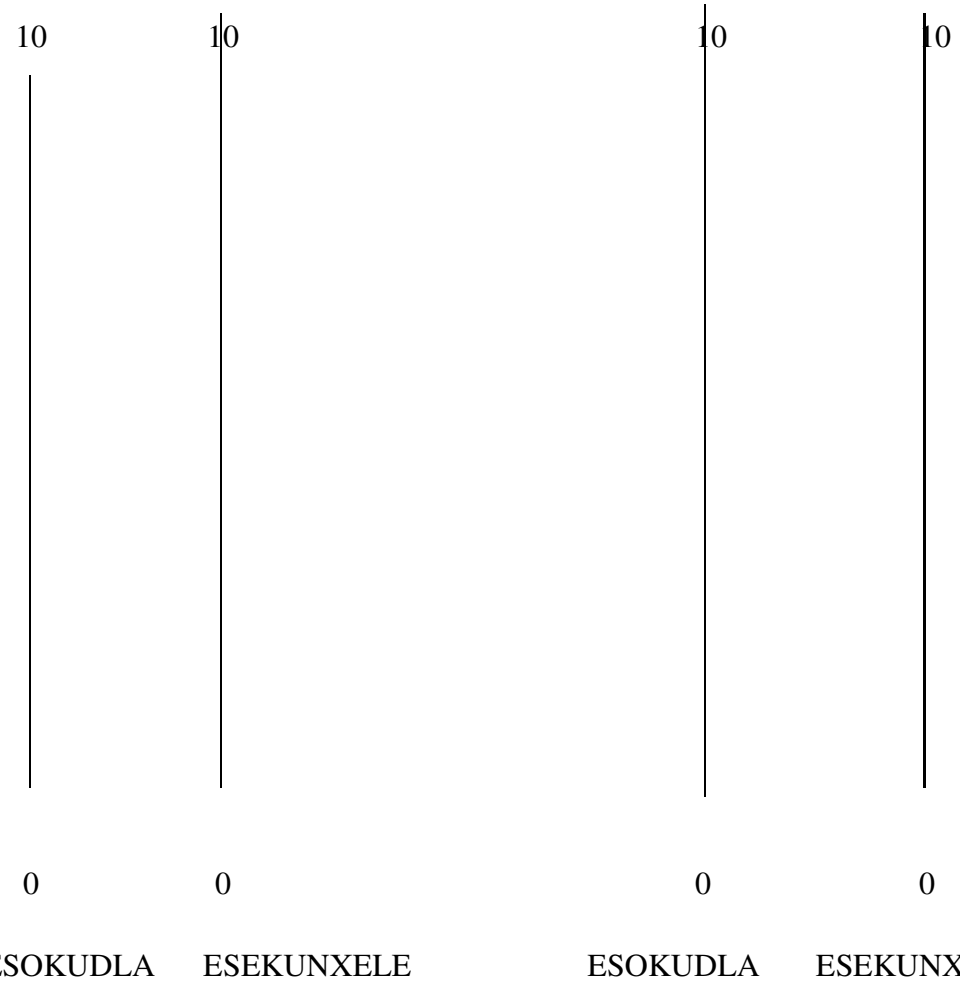
USUKU: _____

UHLELO E: IZIMPAWU ZOKUGULA NEMIBUZO YAKHONA

(*Questions 23 and 24 will be documented by the participant)*

23. Chaza ngobuhlungu obuzwayo uma ungasebenzi?

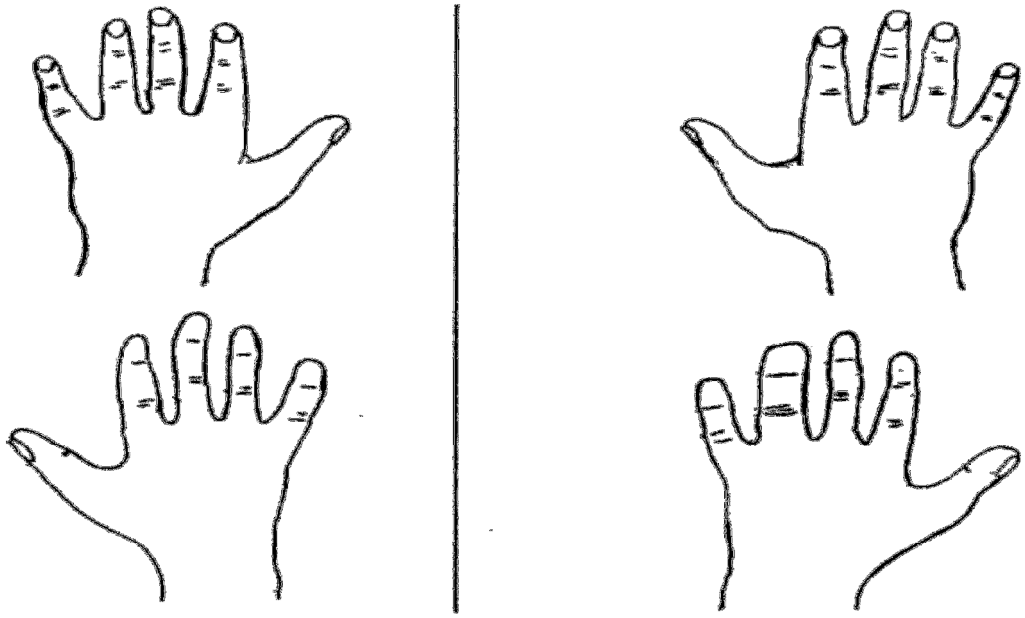
24. Chaza ngobuhlungu obuzwayo uma ungasebenzi?



(dweba umugqa kulaba abangenha ochaza izinhlungu zakho ezandleni umazisebenza noma uphumulile isandla ngasinye.

0 – azikho izinhlungu *10 – kubuhlungu kakhulu*

Enza icross (×) ezithombeni ngezansi ezikhomba indawo ebuhlungu ezandleni zakho



ESOKUNXELE ESOKUDLA

25. Ukuhlolwa ukuthi uzwa kangakanani

INDAWO	KAKHULU		KANCANE		KUKAHLE		ABUKO UBUHLUNGU	
	SOKUDLA	SENXELE	SOKUDLA	SENXELE	SOKUDLA	SENXELE	SOKUDLA	SENXELE
NGAPHAMBILI ENGALWENI								
NGAPHAMBILI KWESITHUPHA								
NGAPHAMBILI KWESANDLA SOKUKHOMBA, ESIPHAKATHI NOCIKICANE								

25. Ukunyakaza kwezandla

KWEZANDLA	UKUNYAKAZA KWEZANDLA																LIMITING FACTOR
	SOKUDLA				SOKUNXELE				SOKUDLA				SOKUNXELE				
	R1	R2	R3	AV.	R1	R2	R3	AV.	R1	R2	R3	AV.	R1	R2	R3	AV.	
ISANDLA: UKUYA PHAMBILI UGOBISE																	
UKUYA EMUMVA UQONDISE																	
UKUYA ESITHUPENI UKUNYAKAZA KWESANDLA																	
UKUYA KUCIKICANE UKUNYAKAZA KWESANDLA																	
ISITHUPHA: UKUYA PHAMBILI UGOBISE																	
UKUYA EMUMVA UQONDISA																	
UKUVULEKA KWESITHUPHA																	
UKUVALEKA KWESITHUPHA																	
IMINWE: UKUGOBISA IMINWE																	
UKUQONDISA IMINWE																	

27. Ngabe unabo ubunzima bokwenza lokhu okulandelayo? (Levine et al. 1993)

	ABUKHO UBUNZIMA	BUKHONA KANCANE UBUNZIMA	BUPHAKATHI NENDAWO	KUNZIMA KAKHULU	KUNZIMA KAKHULU KAKHULU
1.UKUBHALA					
2.UKUFASA INKINOBHO					
3.UKUBAMBA UCINGO					
4.UKUPHATHA ISIKHWAMA ZEZIMPAHLA					
5.UKUGEZA					
6.UKUGQOKA					

28. Ngabe unabo ubunzima bokwenza lokhu okulandelayo? (Chung et al. 1998)

	ABUKHO UNUZIMA	BUKHONA KANCANE UBUNZIMA	BUPHAKATHI NENDAWO	KUNZIMA KAKHULU	KUNZIMA KAKHULU KAKHULU
1.UKUVULA UMNYANGO					
2.UKUCOSHA IMALI					
3.UKUBAMBA INGILAZI YAMANZI					
4. UKUPHENDULA UKHIYE WOMNYANGO					
5.UKUBAMBA IPANI LOKUTHOSA					
6.UKUBAMBA INKOMISHI YETIYE					
7.UKUDLA NGESIPUNI					

29. Ukubamba

	ISANDLA SOKUDLA	ISANDLA SENXELE
DYNAMOMETER READING (1)		
DYNAMOMETER READING (2)		
AVERAGE (3)		

30. Ngabe usuke waba nakho lokhu okulandelayo emzimbeni wakho?

(Umasekudlule isivivinyo, chaza ukuthi yebo noma cha, uyazizwa yini izimpawu zalokho okulandelayo)

			NGAPHAMBILI KWESIVIVINYO	ISIVIVINYO	NGAPHAMBILI KWESIVIVINYO	ISIVIVINYO
IZIMPAWU	ESO	ESE	ESO	ESE	ESO	ESE
UKUSHISA NGAPHAMBILI KWESANDLA NEMINWE						
UKUNYAKAZA NGAPHAMBILI KWESANDLA NEMINWE						
UKULUMA NGAPHAMBILI KWESANDLA NEMINWE						
UKUNGEZWA NGAPHAMBILI KWESANDLA NEMINWE						
UKUVUVUKALA NOKUNGASEBENZI KWESANDLA			[redacted]			
UBUNZIMA BOKUBAMBA IZINTO						

31. Ngabe unazo lezizimpawu?

(Chaza ukuthi uyazizwa yini izimpawu zalokhu okulandelayo ngokuthi uthi yebo noma cha)

			NGAPHAMBILI KWESIVIVINYO	ISIVIVINYO
IZIMPAWU	ESO	ESE	ESO	ESE
UBUHLUNGU OBUZWA ESITHUPENI KWICALA LESITHUPHA				
NGABE KUKHONA YINI UBUHLUNGU OBUNOBOMVU KWICALA LESITHUPHA SAKHO				
UNAKHO YINI UKUVUVUKALA KUCALA LESITHUPHA SAKHO				
UBUNZIMA BOKUBAMBA IZINTO				

32. Kumele ubambe ingalo ibheke phezulu, iminwe ibheke ezansi, noma ikhombe phansi, ucindezele ngemumva kwesandla. Ubambe isikhathi esingange minithi.Umfundisi uzokukhombisa ukuthi kumele wenze njani.

	ESOKUDLA	ESOKUNXELE
OKUQONDILE		
OKUNGAVUMELEKILE		

33. Bamba ingalo yakho ikhombe phezulu neminwe ikhombe phezulu, ophahleni mase ubamba ingaphambili lesandla, ubambe isikhathi esingamaminithi amabili, umfundisi uzoku khombisa.

	ESOKUDLA	ESOKUNXELE
OKOQONDILE		
OKUNGAVUMELEKILE		

34. Bamba isithupha esandleni sakho sangaphambili, mase wenza isibhakela mase ugobisa isandla sakho sibheke phansi, uchaze izimpawu zobuhlungu obuzwayo, umfundisi uzoku khombisa lokhu

	ESOKUDLA	ESOKUNXELE
OKOQONDILE		
OKUNGAVUMELEKILE		

SIYABONGA NGOKUSEBENZISANA NATHI

Appendix 4

Ethical Clearance

UNIVERSITY OF
KWAZULU-NATAL
University of KwaZulu-Natal
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Tel No: +27 31 260 3587
Fax No: +27 31 260 2384
E-mail : naidoos4@ukzn.ac.za

10 November 2010

Miss P Pillay
School of Occupational Therapy
WESTVILLE CAMPUS

Dear Miss Pillay

PROTOCOL: The Prevalence of Signs and Symptoms of Carpal Tunnel Syndrome and De Quervain's Tenosynovitis in Garment Workers
ETHICAL APPROVAL NUMBER: HSS/1277/2010 M: Faculty of Health Sciences

In response to your application dated 27 October 2010, Student Number: **200204300** the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL.**

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steve Collings (Chair)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

SC/sn

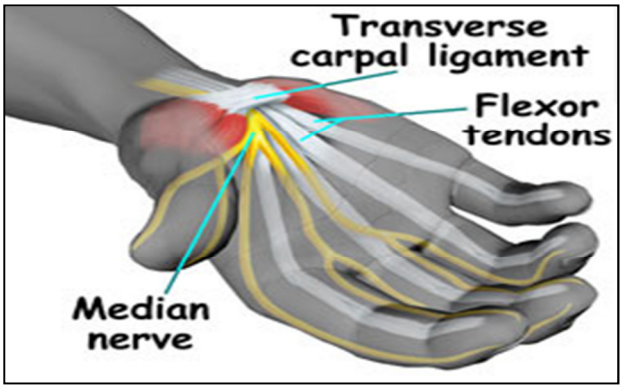
cc: Mrs. P Rangiah (Supervisor)
cc: Mr. S Reddy

Appendix 5a

INFORMATION AND EXERCISE BOOKLET

CARPAL TUNNEL SYNDROME

Too much stretching and pulling of the muscles and nerves of your wrists and your hands may lead to a condition known as carpal tunnel syndrome. This condition is caused most often by movements which are repeated excessively such as sewing and typing motions.



Compression of the Median Nerve in the Wrist (Bartholet, 2001)

The pain that results is caused when the nerve called the median nerve running from your forearm to your hand, gets squeezed or pressed at your wrist position.

SYMPTOMS

Symptoms usually start slowly, with regular burning, tingling, or itching numbness in the palm of the hand and the fingers, especially the thumb, index and middle fingers. Some carpal tunnel sufferers say their fingers feel useless and swollen, even though little or no swelling is present.The symptoms often first appear in one or both hands during the night, since many people sleep with their wrists bent. A person with carpal tunnel syndrome may wake up feeling the need to "shake out" the hand or wrist. As symptoms worsen, people might feel tingling during the day. Decreased grip strength may make it difficult to form a fist, hold small objects, or perform other manual tasks. In severe and/or untreated cases, the muscles at the bottom of the thumb may weaken. Some people are unable to tell between hot and cold by touch.

CAUSES

- Any form of injury to the wrist e.g. break in bones, sprains, stress

- Cysts and tumors in the canal carrying the nerve or smaller carpal canals
- Some people have smaller carpal canals
- Retaining fluid during pregnancy

WHO IS AT RISK?

Carpal tunnel syndrome has a risk of occurring in different people with different sorts of jobs. However, the syndrome is much more common with people who work in manufacturing assembly lines and other assembly related jobs such as sewing, meat, fish and poultry packaging jobs.

TREATMENT AND PREVENTION

Carpal tunnel syndrome can be treated in many ways which include exercise and medications. In more extreme cases, surgery may also be required. Prevention can easily be achieved by using proper office furniture, regular stretching exercises, rest breaks and the use of splints that keep the wrists in a neutral position. Correct posture and wrist positioning also works as well.

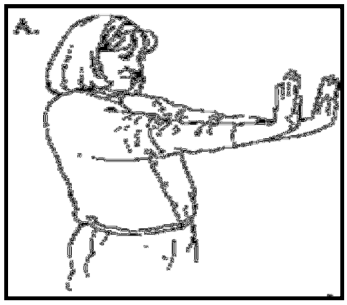
Some basic points that you could do to help your pain are:

- Applying an ice pack wrapped in a towel to the palm and wrist, may help to reduce swelling and pain. Always apply the ice so that it is soothing, and not uncomfortably cold. Ice, and later heat can help. This will not only provide your painful wrist and palm with soothing cold or heat, but it will gently cradle and protect it from further injury.
- Try to prevent your wrist from bending and straightening too much when doing chores.
- When using tools, make sure the handle fits your hand, and you can hold the tool with your whole hand, rather than holding with the tips of your fingers or thumbs.
- Reduce the speed at which your wrist and hands work.
- Exercise your wrists and hands regularly at work. Take a one minute break every 30 minutes to perform some of the exercises shown below.

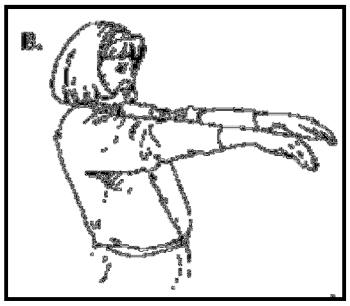
EXERCISES FOR CARPAL TUNNEL SYNDROME

(Exercises by American Academy of Orthopaedic Surgeons, 2000).

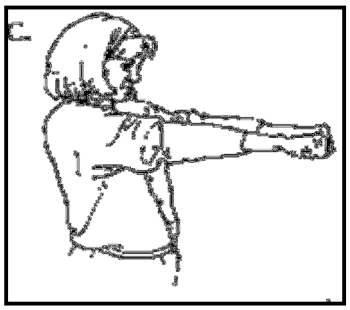
Straighten elbows in front of you and pick up hands to face the ceiling. Hold for a count of 5. Repeat 10 times



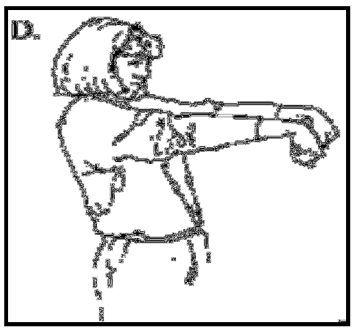
Straighten both wrists and relax fingers. Hold for a count of 5. Repeat 10 times.



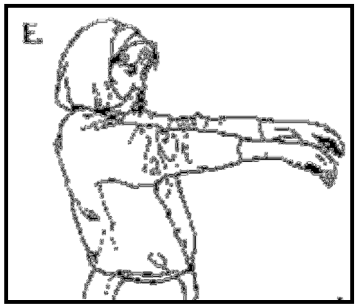
Make a tight fist with both hands.



Then bend both wrists down while keeping the fist. Hold for a count of 5.



Straighten both wrists and relax fingers, for a count of 5.

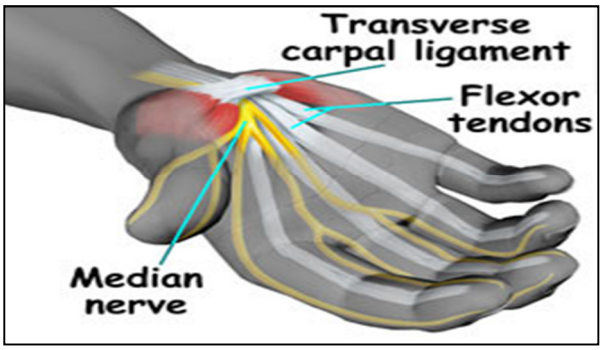


Appendix 5b

ULWAZI LOKULULWA

CARPAL TUNNEL SYNDROME (ISIFO SOKUPHETHWA IZANDLA)

Ukunyakazisa kakhulu, nokudonswa kwezinyama nemisipha kusuka esihlakaleni nasesandleni kungaba nomthelela omubi wokuba nesifo ekuthiwa ukuphathwaizandla. Lesisifo sibangelwa ukunyakaziswa okubangela ukuthunga noma ukuthayipha.



Compression of the Median Nerve in the Wrist (Bartolet, 2001)

Ubuhlungu obenzekayo kubangelwa uma I median nerve esuka engalweni iya esandleni, icindezeleka esihlakaleni.

IZIMPAWU

Izimpawu ziqala kancane, kushise esandleni, kulume ngaphambi kwesandla naseminweni kakhulukazi esithupheni, kumunwe wokukhomba nophakathi nendawo. Lokhukugula bathola iminwe yabo ingasebenzi noma ivuvukele noma, bungekho ubuhlungu nokuvuvukala. Izimpawu ziqhanuka esandleni esisodwa noma zombili njalo ebusuku. Njengoba bonke abantu belala begobise ingalo zabo. Umuntu onalesisifo angavuka afune ukunyakazisa isandla noma isihlakala. Uma ubuhlungu buqhubeka, umuntu angezwa lezizimpawu ngisho emini. Ukungakwazi ukubamba izinto kungenza kubenzima ukwenza isibhakela, ukubhamba izinto ezincane, noma ukwenza loku okujwayelekile. Uma isifo singalapheki noma sesinzima izinyama ngezansi kwesithupha zinga nokuba lula zingakwazi ukubhamba lutho. Abanye abantu abokwazi ukuhlukanisa ukubanda nokushisa uma bekuthinta.

IMBANGELA

- Noma ikuphi ukulimala kwesihlakala kungaba ukuphuka amathambo
- Ukumilwa yinto phakathi nemisipha
- Abanye abantu banezimbobo ezincane
- Woma ukuba namanzi uma ukhulelwe

UBANI OSENGOZINI?

Lesisifo singenzeka kubantu abahlukene abenza imisebenzi ehlukene. Lesisifo sojnwayelekile kubantu abasebenzi lapho kwakhiwa khona, noma okwenziwa khona izinto njengokuthunga.Ukusika inyama nokunye, noma umsebenzi wokupakisha.

UKULAPHWA NOKUVIKELWA

Lokhukugula kungalapheka ngezindlela ezihlukene kungaba ukululwa kwesandla kanye namaphilisi uma kungalapheki ukuhlinzwa kungenzeka. Ukuvikela kungamele umuntu asebenzise indlu enefenisha efanelekile, nokuzivocavoca, ukuphumula nokusebenzisa isiphinti esibeka isihlakala endaweni eqondile.Nokuglina isandla siqondile kanye nesihlakala.

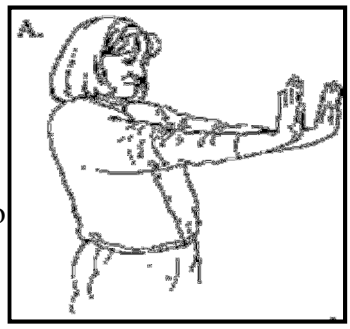
Okumele ukwenze ukuze kwehle ubuhlungu:

- Ukufaka iqhwa uligoqe ngethawula ulibeke esandleni nasesihlakaleni esinenkinga kungasiza ukwehlisa ubuhlungu nokuvuvukala. Uma lingasebenzi iqhwa ukushisa kungasebenza ukwehlisa ubuhlungu.
- Zama ukuthi ungagobisi isihlakala, nokusiqondisa kakhulu uma wenza izinto.
- Uma usebenzisa izinto, kumele isibambo singene kahle/noma sonke esandleni. Ukukwazi ukubamba into kunokubamba ngeminwe.
- Kunele wenze kancane umsebenzi wokunyakazisa isandla.
- Ulule isihlakala nesandla njalo uma usebenza. Njalo thatha iminithi ku ka 30 minithi ukuze uzilule.

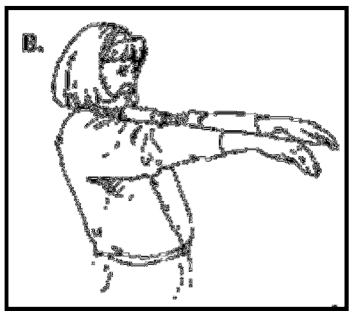
UKUZILULA

(Exercises by American Academy of Orthopaedic Surgeons, 2000)

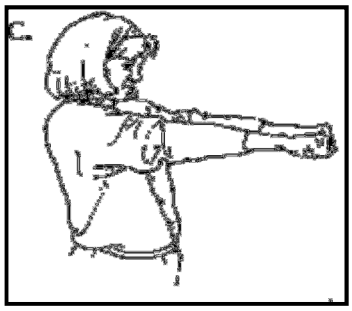
Qondisa ingalo yakho ngaphambi kwakho ibheke phambili, isandla sibheke phezulu, ibhambe lapho ikhona ubale ka 5, ukuphinde lokhu ka 10.



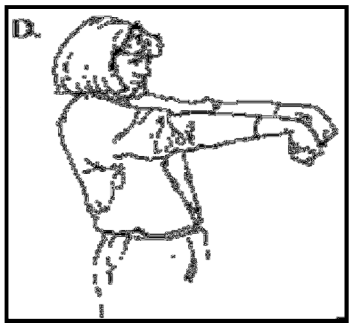
Ukuqondisa zombili izandla, uyekele iminwe ibe lula. Igine kuleyondawo ubale ka 5, ukuphinde lokhu ka 10.



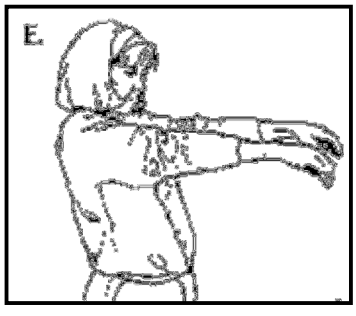
Yenza isibhakela ngezandla zombili ziqondile.



Gobisa isihlakala izandla zombili sibheke phansi, wenze isibhakela igine lapho ubale ka 5.



Qondisa zombili izandla, uykele iminwe ubale ka 5.

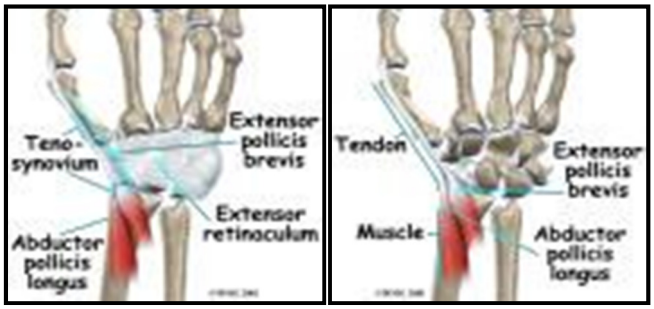


Appendix 6a

DE QUERVAINS TENOSYNOVITIS

De Quervains tenosynovitis is a painful swelling of tendons in the thumb that run in to the wrist (tenosynovitis). The swollen tendons and their coverings rub against the narrow tunnel through which they pass. The result is pain at the bottom of the thumb that can run into the lower arm.

De Quervains tenosynovitis affects two thumb tendons. These tendons are called the abductor pollicis longus(APL) and the extensor pollicis brevis(EPB).



Structures in the Hand (Kasdan, 1999)

SYMPTOMS

The condition can occur slowly or suddenly; in either case, the pain may travel into the thumb or up the forearm. Thumb movements may be difficult and painful, particularly when pinching or grasping objects. Some people also experience swelling and pain on the side of the wrist at the bottom of the thumb. The pain may worsen with thumb and wrist motion. Some people feel pain if direct pressure is applied to the area. Many people explain it as being very sore to pick things up, excruciating pain trying to lift a coffee cup, cannot pinch fingers together or a deep ache at the bottom of their thumbs.

CAUSES

- Direct injury to the thumb or wrist
- Mothers who have babies aged 6 to12 months old due to always lifting the baby
- Activities that may cause this condition are factory work, secretarial duties, golfing and racket sport playing

WHO IS AT RISK?

You are much more likely to develop de Quervains tenosynovitis if you are a woman, especially if you are in your 40s or older. You are also more likely to develop it if one of the following is true:

- Your hobby or job involves repetitive hand and wrist motions. This is a very common cause of the de Quervains tenosynovitis.
- You have injured your wrist. Scar tissue can limit the movement of your tendons.
- You are pregnant. The hormonal changes that occur during pregnancy can cause de Quervains tenosynovitis.

TREATMENT AND PREVENTION

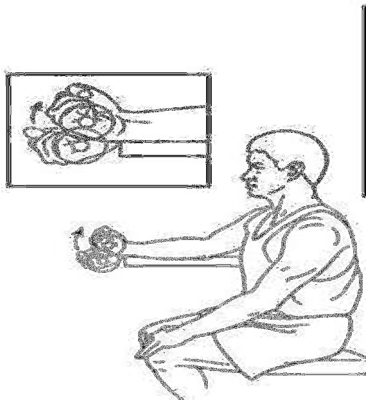
Treatment of de Quervains tenosynovitis usually involves wearing a splint 24 hours a day for four to six weeks to stop any activities that may worsen the condition. This splint is made by an occupational therapist. Ice may be applied to reduce swelling. If symptoms continue, your doctor may give you anti-inflammatory medication or may inject the area with steroids to decrease pain and swelling. If de Quervains tenosynovitis does not respond to the above treatment, surgery may be recommended. A physiotherapist will recommend an exerciseprogram to strengthen your thumb and wrist.

Some basic points that you could do to help the pain are:

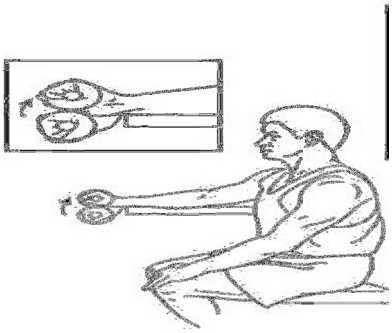
- Avoiding repetitive thumb movements, whenever possible,
- Avoiding pinching with your thumb and another finger together when moving your wrist from side to side,
- Use a cold pack wrapped in a towel over the pain area for 10-15 minutes,
- Speaking with your family doctor about using nonsteroidal anti-inflammatory drugs.

EXERCISES FOR DE QUERVAINS TENOSYNOVITIS

A) WRIST FLEXION: In a seated position, palm facing up, forearm supported on a table, bend your wrist upward. Slowly return to the starting position. Resistance may be added to this exercise by holding a can of soup, a hammer, or a light aerobic weight.

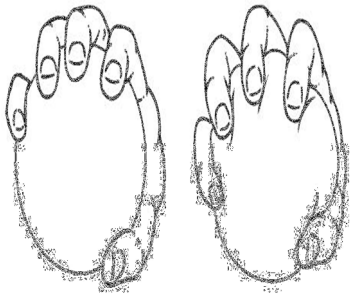


B) WRIST EXTENSION: In a seated position, palm facing down, forearm supported with the wrist hanging off the edge of a table, bend your wrist upward. Slowly return to the starting position. Resistance may be added to this exercise by holding a can of soup, a hammer, or a light aerobic weight.



C) RADIAL DEVITATION: In a sitting or standing position, place your wrist with the thumb up. Slowly bend your wrist in the direction of the thumb, as if to reach the thumb toward the ceiling. Slowly return to the starting position. Resistance may be added to this exercise by holding a can of soup, a hammer, or a light aerobic weight.

D) BALL SQUEEZES: Using a racquet ball, tennis ball, or a hand full of play-do, practice grip strengthening exercises by squeezing the ball. Perform 3 sets of 10 to 15 repetitions



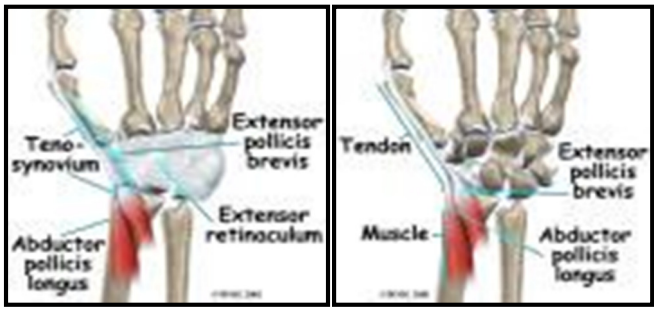
Exercises taken from www.dequervains_rehab.com.

Appendix 6b

DE QUERVAINS TENOSYNOVITIS

Ichaza ubuhlungu nokuvuvukala kumisipha yesithupha yehla iya esihlakaleni. Ukuvuvukala kwemisipha nento eyimbozile ithinta lapho edlula khona uthole ubuhlungu ngezansi kwesithupha kwehla kuya engalweni.

De Quervains tenosynovitis ilimaza umsipha wezithupha ezimbili lemisipha ibizwa ngokuthi i(APL) ne(EPB).



Structures in the Hand (Kasdan, 1999)

IZIMPAWU

Ukugula kungenzeka kancane noma ngokushesha kokunye, ubuhlungu bungaya esithupeni noma engalweni. Ukunyakazisa isithupha kungaba nzima noma kubebuhlungu, uma uncinza noma ubamba into. Abanye abantu bayavuvukala bezwe nobuhlungu kwicala lesihlakala ngezansi kwesithupha. Ubuhlungu bungaqhubeka bubebukhulu ngasesithupheni nasesihlakaleni. Abanye abantu bezwa ubuhlungu uma kuqondene naleyondawo ebuhlungu. Abanye abantu bachaza ukuthi ave kubuhlungu ukuphakamisa into, ukuphakamisa inkhomishi yetiye ave kubuhlungu, abakwazi nokuzincinza ngesithupha.

IMBANGELA

- Ukulimala kwesithupha noma isihlakala.
- Omama abanezingane ezineminyaka ewu 6 kuya ku 12 wezinyanga sebebadala bezwa ubuhlungu njalo bokuphakamisa izingane zabo.
- Ukwenza izinto ezingenza ukugula ukusebenza emafemini, ukuba umabhalane, nokudlala igalofu ne rakheti ukuyidlala.

UBANI OSENGOZINI?

Ungakuthola ukuguliswa ilesisifo uma uwumuntu wesifazane kakhulukazi uma uneminyaka ewu 40 ubudala. Ungakuthola futhi ukugula uma utholakala unalokhu okulandelayo:

- Into oyithandayo noma umsebenzi wakho owenzayo uphindaphindwa uma usebenzisa izandla ne sihlakala lokhu kuhlale kwenzeke kulesisifo se de quervain's tenosynovitis.
- Uma ulimele isihlakala, noma kuvulekile (usikekile) ungeke ukwazi ukunyakazisa isandla noma imisipha.
- Uma ukhulelwe, ama homoni enzeka uma ukhulelwe anga bangela lesisifo.

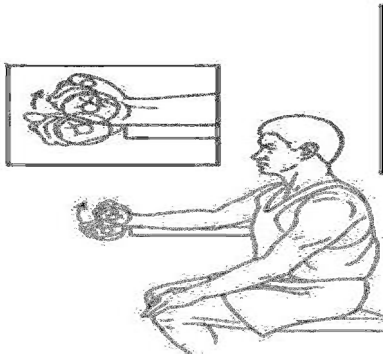
UKULAPHEKA NOKUVIKELEKA

Ukulapha lesisifo njalo kumele ugqoke isphinti ubusuku nemini 24 kusukela kumasonto awu 4 kuya kwawu 6 ungenzi umsebenzi angenza ukugula kuqhubeke lesisiphinti senziwa i occupational therapist. Iqhwa ungafakwa ukwehlisa ubuhlungu buqhubeka udokoteal angakunika amaphilisi okwehlisa ubuhlungu noma umjovo we steroidi ukwehlisa ubuhlungu. Uma ukugula kungehli uma usukwenzele lokhu okungaphezulu, ukuhlinzwa kumele ukwenza. Iphysiotheraphi ingacela ukuthi wenze ukulula kwesandla uqhubeke nacho ekhaya ukuze ukwazi ukulula isithupha nesihlakala.

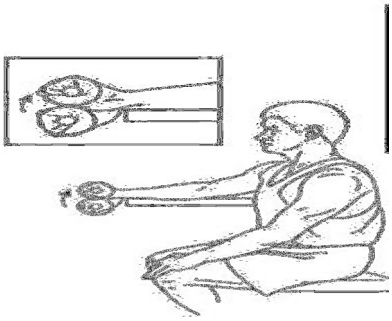
Izinto ongazenza ukwehlisa ubuhlungu:

- Ungawenzi umsebenzi ofuna ukuphindaphindwa
- Ungancinzi ngesithupha sakho noma neminye iminwe, noma unyakazisa isihlakala kwicala lesandla sokudla noma sokunxele
- Sebenzisa into ebandayo, uyigoqe ngethawula lapho kubuhlungu khona isikhathi esingango 10 kuya ku 15 wemizuzu
- Ukuxoxa nodokotela womundeni wakho mayelana nokusebenzisa imithi

UKULULWA KWESANDLA

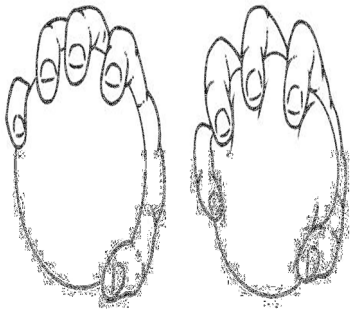


A) UKUGOBISA ISIHLAKALA: Uma uhleli, isandla sibheke phezulu, nendololwane ihleli phezu kwetafula, gobisa isihlakala sibheke phezulu. Kancane usibuyisele lapho kade sikhona.Into ezokwenza kube nzima ukwenza lokhu kungafakwa ngo kuthi ubambe i kani eligwele isobho, noma isando noma into yokujima.



B) UKUGOBISA ISIHLAKALA SIBHEKE PHEZULU: Uma uhleli isandla sibheke phansi, nendololwane ivikelwe isihlakala silenga ekugineni kwetafula, gobisa isihlakala sibheke phezulu, kancane usibuyisele lapho kade sikhona. Ungafaka into ezokwenza kubenzima ngokuthi ubambe ikani lesobho noma isando noma into yokujima.

C) UKUNYAKAZISA ISIHLAKALA SIBHEKE NGASESITHUPHENI: Uma uhleli noma umile, beka isihlakala isithupha sibheke phezulu. Kancane gobisa isihlakala sibheke lapho kukhona isithupha, isithupha sibheke phezulu endlini.Kancane sibuyisile lapho kade sikhona. Ungafaka into ezokwenza kubenza ngokuthi ubambe ikani lesobho, isando noma into yokujima



D) UKUCINDEZELA IBHOLA: Usebenzisa ibhola elithambile, ithenisi bhola noma isandla sigcwele iplayido, zama ukubamba uqinise ibhola ukwenze lokhu wenze konke okubaliwe ngaphezulu ka lo kuya ku 15 uphindaphinda

Lokukululwa kwesandla kuthathwe kwiwww.dequervains_rehab.com.