EFFECT OF FINE MOTOR ACTIVITIES TO IMPROVE ACTIVITIES OF DAILY LIVING ON UPPER EXTREMITY ESSENTIAL TREMOR IN GERIATRIC POPULATION

A PROJECT WORK SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF OCCUPATIONAL THERAPY

(ADVANCED O.T. IN NEUROLOGY)

Submitted By

Reg No. 41091210

JKK MUNIRAJA MEDICAL RESEARCH FOUNDATION

COLLEGE OF OCCUPATIONAL THERAPY

KOMARAPALAYAM – 638 183

Affiliated by

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

CHENNAI – 600 032

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PRINCIPLE EXTERNAL EXAMINER

GUIDE INTERNAL EXAMINER

CERTIFICATE

This is to certify that the Project work entitled, "**EFFECT OF FINE MOTOR ACTIVITIES TO IMPROVE ACTIVITIES OF DAILY LIVING ON UPPER EXTREMITY ESSENTIAL TREMOR IN GERIATRIC POPULATION"** is a bonafide compiled work carried out carried out by **Reg. No. 410911210,** Final year student, College of Occupational Therapy under J.K.K. Munirajah Medical Research Foundation, Komarapalaym - 638 183, in partial fulfillment for the award of Degree of **"Master of Occupational Therapy" (Advanced O.T. in Neurology)** of **The Tamilnadu Dr. M.G.R. Medical University, Chennai-32.** This work was guided and supervised by Dr.T.S.CHELLAKUMARASAMY, M.B.B.S., DPMR., MD (PMR)., at the Department of Occupational Therapy, JKKMMRF, Komarapalayam

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DEDICATION

I sincerely dedicate this project study to my parents and the people who behind me as my strength and motivators in every aspects of my life.

DECLARATION

The undersigned hereby submit that the dissertation **"Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Essential Tremor in Geriatric Population"** is my original work and is not substantially the same as one already submitted by any one at any university, to the best of my knowledge and belief.

(Reg. No. 41091210)

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ABSTRACT

BACK GROUND OF THE STUDY

Patients with Essential Tremor have been found to exhibit upper extremity tremor as more obvious. This upper extremity tremor significantly affects an individual ability to perform everyday task, fulfill former roles and maintain personal-social relationship. This study is to determine whether occupational therapy intervention of fine motor activity protocol based on manual dexterity and coordination activities would effectively improve the activities of daily living among essential tremor in geriatric population.

AIM

The aim of the study was to find out the "Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Essential Tremor in Geriatric Population".

METHODOLOGY

A total of 30 patients suffering from essential tremor were selected and randomly allocated to the experimental and controls till the number of 15 subjects were reached in each group matched for age gender and chronic of illness. Assessments were done to measure the upper extremity tremor using Glass Scale, Archimedes Spiral Drawing and functional independence was measured using Tremor Activities of Daily Living Scale (TADLS). A structured occupational therapy intervention of fine motor protocol based on manual dexterity and coordination activities was tailored and implemented.

RESULT

After implementation patients who received occupational therapy intervention showed significant improvement in the area of fine motor activity and functional independence.

DISCUSSION

Occupational therapy strategies depends primarily in systematic gradation and training of task parameters and functional adaptation which has yielded an improvement in the underlying upper extremity tremor and provided much benefit for community living. The findings say that improvement of daily living functions was related to improvement of functional independence and reduce the level of upper extremity tremor after intervention.

CONCLUSION

There is a significant improvement in upper extremity essential tremor in geriatric population who receive fine motor activity protocol based on manual dexterity and coordination activities of occupational therapy intervention.

(Reg. No. 41091210)

INTRODUCTION

INTRODUCTION

Essential Tremor is the most common tremor disorder, and it is the most prevalent movement disorder worldwide. It is estimated prevalence ranges from 0.1% to 22%, depending on the diagnostic criteria. It is 20 times more than Parkinson's disease. The diagnosis is based on clinical findings, and treatment is mainly symptomatic.

Essential tremor is a chronic condition characterized by involuntary, rhythmic tremor of a body part, most typically the hands and arms. In most patients, essential tremor considered a slowly progressive disorder and in some patients, may eventually involve the heads, voice, tongue, legs, and trunk.

Hand tremor is the most common form of essential tremor. It is typically biphasic and involves agonist and a antagonist muscles. It is usually present in both hands (bilateral); however, in about 10% to 15% of patients, tremor is first noted in the dominant hand. The frequency of the tremor is between 4 to 12 Hz.

Essential tremor affects male and female equally. It differs from Parkinson's disease, characterized by resting tremor, muscle stiffness (rigidity), and a generalized slowness of movement (bradykinesia). With essential tremor, hand tremor is present with voluntary movement and is absent when the hands are at rest. It does not cause slowness of movement or muscle stiffness.

Essential tremor is a slowly progressive, chronic condition. The symptoms of essential tremor may begin at any age; however, onset is rare in childhood, and the incidence of essential tremor increases with advancing age. The average age of onset is about 45 years. Symptoms of essential tremor often involve both kinetic and postural tremors. Kinetic tremor occurs when a person attempts any voluntary, coordinated movement. These tremors may interfere with fine motor skills such as writing, eating, or drinking from a cup.

Postural tremor arises while voluntarily holding a body part in a fixed position against gravity. Within and among families, the tremors can range from being mild and a minor annoyance in one individual to severe and disabling in another family member.

Although essential tremor is not life threatening, it can have a tremendous impact on the quality of daily life. Medical, rehabilitation, as well as surgical treatments are available. The simple examination included six tests; arm extension, pouring water, drinking water, using a spoon, finger-to-nose movements, and drawing spirals with each arm.

The upper extremity tremor of essential tremor affects both manual dexterity and coordination activities mainly for fine motor skills for activities of daily living. The weighted cuff is the universal technique for rehabilitation to reduce tremor in movement disorder clients. The buildup pen, pencil, utensils and weighted objects for self-care and household activities based on occupational therapy intervention proved to be improvement in quality of life in movement disorders.

The occupational therapy intervention is the slow and steady process of treating the clients with long term conditions. A fine motor activity protocol been framed based on the structural gradation strategy of both manual dexterity and coordination activities been localized therapy and been given through 8 weeks of two month duration. The combined weighted cuff and intervention through the fine motor activity protocol has to be validated to show the strength of occupational therapy also play the vital role in the tremor disability.

The use of alcohol reduce the symptom of tremor in essential tremor patients been visibly proved in the movement disorders society but the incidence of addiction been noted and withdrawal symptoms occurs after the long use. The thalamic deep brain stimulation is also a surgical technique to reduce the tremor symptoms in essential tremor patients but the recurrence also been noted in some studies.

Thus instead of reducing the tremor and damaging our other systems, we have seen the disability affects the functional independence of the person and better communicating in the society. While using some of the simple strategies with universally accepted weighted cuff can be better choice for a client to deal with his everyday challenges, when he attempts to perform his daily routine with independence.

The occupational therapy intervention is to minimize functional disability, reduce social handicap, and improve quality of life. The hand dexterity is the most important function for doing everyday activities. Fundamental to occupational therapy is activity, which focuses on participation in functional activities.

To live productively all people must develop and use a variety of skills in constantly adapting to environment demands. For many, disease, aging, disability, illness or trauma complicates these everyday processes. Therapy can utilize “occupation” or “productive activities” to overcome these disabling conditions.

Occupational Therapy improves functional independence. All persons have the right to optimal functioning. People deserve to live productively in the least restrictive environment and must take an active role in their own skill development and functioning recovery. Each person has strengths on which to build. Occupational therapy facilitates all of these goals.

Occupational therapists work in restoring functional activities, also known as activities of daily living. These activities include basic tasks such as dressing and feeding and higher level skills such as money handling and driving and household management.

Thus the topic Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Tremor of Essential Tremor in Geriatric Population is needed.

AIM AND OBJECTIVE

AIM:

To find out the Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Essential Tremor in Geriatric Population

OBJECTIVE:

The general objective of this study is to estabilish the Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Essential Tremor in Geriatric Population

HYPOTHESIS

ALTERNATIVE HYPOTHESIS:

Fine motor activities protocol is based on the manual dexterity and coordination activities can make a significant difference in activities of daily living of upper extremity essential tremor in geriatric population.

NULL HYPOTHESIS:

Fine motor activities protocol based on the manual dexterity and coordination activities do not make a significant difference in activities of daily living of upper extremity essential tremor in geriatric population.

RELATED LITERATURE

Essential tremor (ET) is considered the most common neurologic movement disorder. It may affect as many as 10 million people in the United States and be 20 times more prevalent than Parkinson's disease. ET is a chronic condition characterized by involuntary, rhythmic tremor of a body part, most typically the hands and arms. In most patients, ET is considered a slowly progressive disorder and, in some patients, may eventually involve the head, voice, tongue (with associated dysarthria), legs, and trunk. However, in many people, the disease may be relatively non-progressive and the tremor may be mild throughout life.

Hand tremor is the most common form of essential tremor. It is typically biphasic and involves agonist and antagonist muscles. It is usually present in both hands (bilateral); however, in about 10% to 15% of patients, tremor is first noted in the dominant hand. The frequency of the tremor is between 4 to 12 Hz.

Tremor may be most visible while the patient is voluntarily maintaining a fixed position against gravity (e.g., outstretched arms, etc.). This type of tremor, termed a "postural tremor," is a major component of classic ET. The tremor is apparent while holding the body part in a fixed position. In some patients, the tremor may worsen upon performance of self-directed tasks or goal-directed movements. This component of essential tremor is termed as an "intention tremor" meaning that it is present with targeted actions, a form of "kinetic tremor". ET sometimes results in what is referred to as an "internal tremor." Patients most often describe this feeling as a general "shakiness" or a vibrating sensation in the body. All tremors usually disappear during sleep. Unlike the resting tremor associated with Parkinson's disease during which muscles are not voluntarily activated, the symptoms of essential tremor are either absent or minimal during periods of rest.

As the disease progresses, individuals with ET experience varying degrees of functional disability and resultant handicap based on the severity of the tremor. Affected individuals may have difficulty performing everyday tasks requiring fine motor manipulation skills. Holding or manipulating small objects, such as small tools or utensils, may be difficult. Hand tremor may cause difficulties with writing, drinking fluids from a glass or cup, eating, sewing, applying makeup, shaving, or dressing, for example.

In individuals with ET, the next most frequently affected area of the body is the head, followed by the voice, tongue, legs, or trunk. These tremors may occur in isolation or along with tremor of the hands, arms, etc. The movements associated with head tremor usually occur in a horizontal "no-no" pattern (in about 75%); however, in some patients, head tremors may occur in a vertical "yes-yes" pattern. In advanced cases, tremor of the voice, tongue, and palate may lead to dysarthria. In these patients, the voice is usually "shaky" or has a "trembling" quality. Such tremors are uncommon in individuals under the age of 65 years.

The psychosocial effects of ET may be embarrassing and debilitating. ET may eventually affect the patient's ability to perform certain work-related tasks; interfere with activities of daily living; or lead to withdrawal from social activities and interactions due to embarrassment.

In some patients with ET, other neurologic symptoms may also be present such as unsteady, uncoordinated manner of walking (tandem gait disturbance [ataxia]). This finding may be more common than previously believed; however, its occurrence seems to be more frequent in older patients or those with long-standing disease (>5 years' duration). In many people, the disease may be relatively non-progressive and the tremor may be mild throughout life.

ASSOCIATED FINDINGS

In 1994, the Essential Tremor Study Group reported on the relationship of ET to other movement disorders in 678 patients with ET. Several conditions have been reported in association with essential tremor including Parkinson's disease (6.1%), coexisting dystonia (6.9%), and myoclonus (1.8%). The Study Group concluded that the frequency of Parkinson's disease in individuals with ET is greater than would be reported in the general population and that other movement disorders are infrequently observed in association with essential tremor. Other reports have indicated a higher percentage of coexisting dystonia (47%) and ET since postural tremor associated with dystonia may resemble that seen in ET. There are also reports of an association between ET and migraine headaches. One study suggested that the prevalence of migraine in individuals with ET is greater than in the general population. The correlation may be as high as 26%.

HISTORY/EPIDEMIOLOGY

Essential tremor was first described in 1817 by James Parkinson who differentiated between Parkinsonism and what was later defined as essential tremor. In 1887, Dana compiled the first organized account of ET. Critchley reported on a large study of the condition in 1949.

Estimates concerning the prevalence of essential tremor in the general population vary greatly from 0.08 to 220 cases per 1,000 people (a 2750-fold difference). The results of population studies may be difficult to assess due to misdiagnosis (e.g., such as assigning the tremor to old age), overlooked diagnosis, or unclear diagnostic criteria. In one epidemiological review study in which centers were provided with predetermined diagnostic criteria, used the definition of ET as an action tremor, and employed community-based designs, the prevalence of ET was 4.1 to 39.2 cases per 1,000 (a 9.6-fold difference). When age was considered, the prevalence of ET in individuals over 60 years was 13.0 to 50.5 cases per 1,000. In another report, prevalence in Americans was estimated at 300 to 415 per 100,000.

ET affects males and females in equal numbers. In some patients, the symptoms begin during adolescence and then disappear for decades, only to remerge during late adulthood.

CAUSES/GENETICS

Essential tremor is usually considered a slowly progressive, chronic condition. However, there may be periods when the symptoms remain unchanged and do not worsen. In addition, in many people, the disease may be relatively non-progressive and the tremor may be mild throughout life. The symptoms of essential tremor may begin at any age from childhood through late adulthood. However, onset is rare in childhood, and the incidence of ET increases with advancing age. The mean age of onset is about 45 years.

Overall, the symptoms and the possibility of related functional disability tend to progress with increasing age. As the disease progresses, tremor frequency may decrease; however, tremor amplitude may increase. Increased amplitude is associated with a decreased ability to manage fine, discrete motor tasks. Therefore, physical and functional disability leading to handicap and social embarrassment may increase with advancing age.

ET may occur sporadically or be inherited as an autosomal dominant trait. In such familial cases, children of affected individuals have a 50% risk of inheriting a gene for essential tremor and eventually developing the disease. Gene penetrance is nearly complete by the age of 65 to 70 years. According to the 1994 Essential Tremor Study Group, a positive family history was reported in more than 60% of 678 patients with ET. In other studies, the percentage of those who reported a family history of ET has ranged from 17% to 70%.

Because of decreased penetrance, many people may be unaware of other family members with ET and therefore these cases may appear to be sporadic.

A familial essential tremor gene (*FET1* or *ETM1*) maps to a region on the long arm of chromosome 3 at q13. Another gene for ET, the so-called *ETM2* gene, maps to a region on the short arm of chromosome 2 at p22-p25. Researchers hope that characterization of the gene(s) that cause ET will enhance understanding of motor diseases in general.

A team of researchers who helped to map the *ETM2* gene examined a large American family of Czech descent in which 18 of 67 family members had ET. In this family, each generation tended to develop symptoms of the disease at an earlier age than those in previous generations, suggesting possible genetic anticipation. Other studies have not supported anticipation and argue that in families affected by tremor, there may be a heightened awareness of tremor. Thus, the symptoms may be recognized at an earlier age.

PATHOPHYSIOLOGY

The underlying mechanism of essential tremor is not known although several theories have been proposed. In a study of individuals with ET, results of an advanced imaging technique known as positron emission tomography (PET), which examines the biochemistry of the brain, suggested an abnormality in the olivo-cerebellar tracts of the brain. In addition, PET testing in patients with essential tremor reveals increased activity in one brain region known as the cerebellum even while at rest, a finding that is consistent with the cerebellum having an important role in the generation of tremor. Other researchers are investigating the role of stretch loop circuits as well as circuits within the central nervous system that may become unstable and drive muscle contractions (central oscillators), or a combination of both to produce tremor as in ET. A report published in 1997 about the role of clonidine in ET, lends support the theory of a central oscillating "pacemaker" in ET.

In another study, 12 people with ET and 15 control subjects underwent functional magnetic resonance imaging (fMRI) studies of the brain. The results suggested that ET is mainly associated with an additional contralateral cerebellar pathway activation and overactivity in the cerebellum, red nucleus, and globus pallidus without significant intrinsic olivary activation.

It was reported that alcohol suppression of ET is mediated through a reduction in overactivity (cerebellar synaptic), resulting in an increased afferent input to the inferior olivary nuclei. The ingestion of ethanol led to bilateral decreases of cerebellar blood flow in both tremor patients and normal subjects, and this was associated with suppression of tremor in the patients. Moreover, alcohol-associated increases of regional cerebral blood flow were observed in the inferior olivary nuclei in the patients but not in the control subjects.

A group of drugs known as beta-adrenergic blockers such as propranolol are known to improve the symptoms associated with ET. It is possible that these beta-blockers work through peripheral $beta_2$ skeletal muscle adrenoreceptors (receptor mechanisms). However, beta-blockers may also affect central pathways.

More controlled studies are required to further investigate the underlying mechanisms of ET.

DIFFERENTIAL DIAGNOSIS

The impacts of misdiagnosis or late diagnosis can be far-reaching. For example, misdiagnosis may lead to inappropriate treatment. If tremor is improperly assigned to old age or anxiety, the opportunity for early effective treatment may be lost. Tremors—as opposed to essential tremor—may also be associated with the use of certain medications or may be the result of different conditions, such as Parkinson's disease, myoclonus, or Wilson's disease. Other diseases associated with tremor include...

Pallidonigral degeneration

Multiple system atrophy

Olivoponto cerebellar atrophy

Striatonigral degeneration

Progressive pallidal atrophy

Huntington's disease

Benign hereditary chorea

Fahr's disease

Paroxysmal dystonic choreoathetosis

Familial intention tremor and lipofuscinosis

Ramsay-Hunt syndrome (progressive myoclonic ataxia)

Ataxia telangiectasia

Dystonia musculorum deformans

DOPA-responsive dystonia

Spasmodic torticollis

Meige syndrome

Task-specific tremor (writer's or voice tremor)

Space occupying lesions of the brain

Various metabolic diseases (e.g., hepatic encephalopathy, etc.)

Peripheral neuropathies (e.g., Charcot-Marie-Tooth, Guillain-Barré, etc.)

Proper diagnosis is crucial as these conditions may also require medical attention. Some people with ET also have associated dystonia including cervical dystonia, writer's cramp, spasmodic dysphonia, and cranial dystonia. Occasionally, patients report associated Parkinsonism. The late diagnosis of ET delay treatment and increases the likelihood of functional disability and related psychosocial problems.

Essential tremor may be incorrectly assigned to other conditions or, in severe cases, be mistaken for Parkinson's disease, despite the many differences between the two diseases. For example, PD is characterized by hypokinetic features and rigidity. Other conditions that may be mistaken for ET include asterixis, epilepsia partialis continua, clonus, and rhythmic myoclonus.

DIAGNOSIS

Although commonly seen in family medical practice, essential tremor may be difficult to diagnose and equally challenging to treat. Some patients may wait up to 20 years before seeking appropriate medical evaluation for their worsening symptoms. ET is a clinical diagnosis; there is no definitive test for essential tremor. Since most people with ET benefit somewhat from drug therapy, early diagnosis and prompt, appropriate treatment may delay or eliminate functional disability. Essential tremor is best diagnosed by a physician who has experience with tremor and movement disorders.

It is possible to measure tremor and assess its impacts on patients in a variety of ways. These include electrophysiologic techniques (e.g., EMG, accelerometer, spectral analysis, and weighting of the body part), clinical rating scales (e.g., tremor scale [see below]), and simple objective tests of hand and arm functions. The results of patient interviews and responses to questionnaires help to measure total disability, resultant handicap, and impact on quality of life.

Several tremor classification scales have been proposed to assist physicians to distinguish between the different types of tremor, such as action and resting tremors and other variants and to appropriately diagnosis the type of tremor (e.g., probable or possible ET, classic ET, etc.). These proposed classifications include Collaborative Clinical Classification of Tremor (which includes distinction between tremor types, data from medical history, and results of neurologic evaluation) and the Tremor Research Investigation Group (TRIG) Classification of Essential Tremor (which has inclusion and exclusion criteria for definite, probable, and possible ET).

Clinical evaluation is typically based on a thorough medical history and assessment of the patient's symptoms including:

Anatomic distribution (topography)—i.e., area or areas of the body affected by tremor (e.g., arms, hands, head, voice, tongue, legs, chin, trunk).

Tremor type or activation condition. For example, essential tremor is primarily a postural tremor that is present during activation of affected muscles.

Amplitude/intensity and frequency—i.e., measures of severity that have a direct correlation with functional disability. These parameters may be measured by assessing EMG-based activities in the extensor and flexor muscles of the wrist. A tremographic accelerometer may also be used to document these movements.

Muscle contraction pattern (agonist—antagonist interaction). The manner in which the extensors and flexors "cooperate" to generate the movement. In ET, there is usually simultaneous activation/contraction of these muscles. However, in Parkinson's disease, the extensors and flexors contract alternatively.

Degree of functional disability and resultant handicap. Assessment may include the direct evaluation of Archimedes spiral and line drawing, handwriting samples, or water pouring, or a review of movements on videotape.

Psychosocial problems and their impact on the patient's life—i.e., quality-of-life measurement and the effects of tremor on daily living.

Coexistence of other neurologic signs or symptoms (e.g., tandem gait disturbance). Examination may include assessment of muscle tone (including Froment's sign), postural abnormalities, akinesia/bradykinesia, and cerebellar signs.

Long-latency reflexes.

Duration of symptoms.

Family history of ET and other neurologic disease.

History of disease progression (e.g., from the hands to the arms, etc.).

Current medication regimen and their response to their medications.

Various methods may be used to evaluate the different aspects of ET. These include physiologic techniques, clinical assessments, and functional performance tests. For example, the physiologic aspects of hand tremor may be measured using a specialized device known as an accelerometer. During such testing, the device is attached to the underside of the index finger of the hand. The resulting tremorgram records the frequency and amplitude of the tremor. The frequency of ET varies from 4 to 12 Hz.

The severity of arm tremor may be clinically assessed by using a clinical rating scale and by scoring tremor in Archimedes spirals. Tremor and associated disability seems to increase with advancing age and increasing tremor duration. It is possible that the frequency of ET may decrease with advancing age; however, the amplitude of the tremor may increase, leading to increased disability. In addition, there seems a direct correlation between age at tremor onset and either tremor severity or disability.

TREMOR SCALE (symptomatic complaint of tremor in any part of the body)

0 == Absent (no tremor or writing impairment)

1 == Slight and infrequently present (mild tremor, writing, and drawing of spiral minimally impaired)

2 == Moderate; bothersome to most patients (writing and drawing of spiral moderately impaired)

3 == Severe tremor (writing and drawing severely impaired; interferes with many activities such as drinking liquids)

4 == Marked tremor (interferes with most activities)

Once a diagnosis of ET is established, studies may be performed to rule out pre-existing conditions that may also produce tremor (e.g., hypothyroidism, drug-induced tremor, Wilson's disease, lesions of the cerebellum or midbrain, peripheral neuropathy, traumatic injury, etc.). Other tremor-associated disorders include acute and chronic polyneuropathy; hereditary motor and sensory neuropathies such as Charcot-Marie-Tooth disease; Guillain-Barré syndrome; metabolic neuropathies (e.g., Refsum syndrome, etc.); and peripheral nerve entrapment syndromes.

APPROACHES TO TREATMENT

Most people with essential tremor benefit from drug therapy. Early appropriate treatment may delay or eliminate functional disability. The approach to the treatment of ET needs to be balanced, taking into account the patient's history, response to previous treatment, coexisting diseases, and other factors. The initiation of drug (pharmacologic) treatment of essential tremor is based on an evaluation of the benefits and side effects of particular medications. A surgical approach to treatment may be suggested for people with severe ET symptoms or those whose symptoms have not responded to the maximum acceptable dosages of medication used to treat the disease. The physician, patient, family members, and caregivers must work together to weigh the possible risks versus the potential benefits of a surgical approach to treatment.

LIFESTYLE CHANGES:

It may be advisable to restrict or eliminate caffeine from the diet (e.g., in soda, coffee, tea, chocolate, etc.) as well as other stimulants as they may contribute to a temporary aggravation of ET symptoms. In addition, specialists in physical and rehabilitative medicine may assist patients with ET who are not receiving drug therapy. For example, exercises with 1- to 2-

pound weights strapped to the wrist may help to promote hand stability. In certain individuals, a small quantity of alcohol may decrease tremors; however, this approach to treating Essential Tremor is controversial and not generally recommended. Although consumption of small amounts of alcohol may pose no risk to some people, it may lead to alcohol dependence in other susceptible individuals. In addition, there may be a rebound worsening of ET symptoms the day after alcohol consumption. The mode of action by which alcohol decreases ET symptoms is not fully understood. Caffeine may modify ET symptoms in some patient and not in others.

PHARMACOLOGIC TREATMENTS

First-line drug therapies for the treatment of ET include

PROPRANOLOL:

The response of ET symptoms to treatment with the beta-blocker propranolol is highly variable. Beta-adrenergic blockers are a class of drugs that inhibit response to adrenergic stimulation by blocking B-adrenergic receptors in heart muscle and other smooth muscle. Blockage of this stimulation effectively results in a decrease in in heart rate and cardiac output as well as a reduction in blood pressure. Approximately 50% to 70% of patients obtain some symptomatic relief. However, only in rare cases is the tremor totally suppressed. Beta-adrenergic blockage helps to control the involuntary, rhythmic movements of ET. Tremor amplitude is usually decreased; however, the frequency of tremor usually remains unaffected. The average reduction in tremor is about 50% to 60%. As the severity of the tremor lessens, functional disability also diminishes. However, some individuals will not respond to propranolol and the drug is often not well tolerated in older individuals.

PRIMIDONE:

Primdone, an anticonvulsant medication related to phenobarbital, slows the central nervous system and helps to reduce or control seizure activity in certain types of epilepsy. In addition, primidone is considered a first-line therapy for the treatment of patients with essential tremor.

Six studies have been conducted to determine the rate of response to primidone. These studies reported varied rates ranging from a 60% to a 100% response. However, some patients will not respond to primidone therapy. One report estimated that about 71% of patients respond positively to primidone. Patients should not abruptly discontinue therapy with primidone. After consultation with a physician, the dosage is reduced gradually.

OTHER DRUG THERAPIES

Second-line drug therapies for the treatment of Essential Tremor include benzodiazepines, a class of drugs that interferes with chemical activity in the nervous system and brain, serving to reduce communication between nerve cells and to a "slowing down" the central nervous system. Such medications promote sleep, relieve anxiety, reduce restlessness, and relax muscles. Examples of benzodiazepines that have been used to treat patients with ET include clonazepam, lorazepam, alprazolam, and diazepam.

Selected patients with ET who do not respond to drug therapy may receive local injections of botulinum toxin (BTX) type A (Botox®). Some improvement in symptoms has been noted. Chemodenervation with BTX may significantly ameliorate essential hand tremor in patients who fail to improve with conventional pharmacologic therapy.

A small, randomized study compared the relative effectiveness of propranolol or gabapentin (Neurontin®) against a placebo. Treatment with propranolol or gabapentin yielded improvement in symptoms as measured by the Tremor Clinical Rating Scale (TCRS including clinical examination, motor task performance, ADLs, and subjective assessment), accelerometry, and a patient-reported disability scale. The results suggest that gabapentin may have a role in the treatment of ET; however, more studies are needed to determine the long-term safety and efficacy of gabapentin for the treatment of individuals with ET.

SURGICAL APPROACHES TO TREATMENT

Surgery may be suggested to treat some individuals with essential tremor, particularly those who have not responded to conventional drug therapies. Patients are carefully selected as possible candidates for surgery. Invasive surgical intervention is usually reserved for patients with severe, disabling tremor on one side (unilateral) or both sides (symmetric) of the body; functional disability that interferes with the activities of daily living; or tremor that is unresponsive to the highest tolerated doses of medications used to treat ET.

THALAMOTOMY:

During a stereotaxic thalamotomy, a selected portion of the thalamus is surgically destroyed (ablation). These paired structures deep within the brain are involved in the control of movement. In this procedure, neurosurgeons use specialized equipment, enabling them to use three-dimensional coordinates to precisely locate the ventral intermediate nucleus (Vim) of the thalamus. This region of the brain is involved in the control of movement. Extreme care is exercised since the thalamus is located near other important structures in the brain.

The possible complications of thalamotomy include contralateral weakness (hemiparesis), confusion, or dysarthria. Although these symptoms are relatively common during the postoperative period, they are usually short-lived and recede within a short period of time.

DEEP BRAIN/THALAMIC STIMULATION

Thalamic stimulation is an invasive surgical procedure that seems to mimic the positive effects of surgical ablation performed during a thalamotomy. In general, the results are equal to or better than those reported in patients with ET who have had a thalamotomy, and thalamic stimulation is believed to be an effective means of treating ET in selected patients. Thalamic deep brain stimulation may effectively improve limb tremor in patients with ET.

During this procedure, electrodes are implanted in a specific area of the brain (i.e., ventral intermediate [Vim] nucleus of the thalamus). In addition, a device known as an implantable pulse generator (IPG) is placed under the skin (subcutaneous) in the area of the collarbone. After appropriate postoperative testing, leads from the implanted electrodes are connected to the pulse generator, which then delivers continuous high frequency electrical stimulation to the thalamus via the implanted electrodes. This form of stimulation helps the thalamus "rebalance" the control messages in the movement control centers of the brain, serving to suppress the tremor. Patients may turn the pulse generator off and on by passing a hand-held magnet over the device. The batteries that power the pulse generator need to be surgically replaced every 3 to 5 years.

In ET patients, adverse events due to thalamic stimulation are generally mild. The intensity of complications or side effects usually correlates with the intensity of stimulation. The possible complications of thalamic stimulation include mild dysarthria, weakness on one or both sides of the body, or disturbance of normal balance (disequilibrium). In most cases, unusual sensations (paresthesias) such as numbness or tingling in the head and hands may occur after surgery; however, these sensations typically resolve with ongoing adjustment of the stimulator settings. About 6% of patients experience marked dysarthria or permanent, though tolerable, paresthesias.

LITERATURE REVIEW

1. **Alusi SH, Worthington J, Glickman S, Findley LJ, Bain PG:**

"Evaluation of three different ways of assessing tremor in multiple sclerosis" Rating tremor on posture had a good intrarater and interrater reliability. However, these reliabilities decreased when kinetic tremor was assessed, in part because dysmetria was a confounding factor. The intrarater reliabilities of rating tremor from spirals and handwriting were also good but the interrater reliabilities were only fair to moderate. Tremor severity scored by all three methods correlated highly with scores obtained from the nine hole peg test, finger tapping test, and a tremor related activities of daily living (ADL) questionnaire, indicating that all three methods were valid ways of assessing tremor in multiple sclerosis. Multiple sclerosis tremors in posture can be scored using a clinical rating scale in a valid and reliable way and from spirals and handwriting samples if the ratings are carried out by the same examiner. However, scoring kinetic tremor was less reliable. In addition, the nine hole peg and finger tapping tests provide useful objective assessments of upper limb function in tremulous patients with multiple sclerosis.

2. **Keogh JW, Morrison S, Barrett R:**

Strength and coordination training are both effective in reducing the postural tremor amplitude of older adults. The current study investigated the effect of 2 different types of unilateral resistance training on the postural tremor output of 19 neurologically healthy men age 70-80 yr. The strength- (n = 7) and coordination-training (n = 7) groups trained twice a week for 6 wk, performing dumbbell biceps curls, wrist flexions, and wrist extensions, while the control group (n = 5) maintained their normal activities. Changes in index-finger tremor (RMS amplitude, peak, and proportional power) and upper limb muscle coactivation were assessed during 4 postural conditions that were performed separately with the trained and untrained limbs. The 2 training groups experienced significantly greater reductions in mean RMS tremor amplitude, peak, and proportional tremor power 8-12 Hz and upper limb muscle coactivation, as well as greater increases in strength, than the control group. These results further demonstrate the benefits of resistance training for improving function in older adults.

3. **Gironell A, Martinez-Corral M, Pagonabarraga J, Kulisevsky J:**

The Glass scale: a simple tool to determine severity in essential tremor. Using the scale involves asking the patient one question: "Over the last week, when you were sitting down at the table, how did you drink water from a glass?" Scores: I - I have no difficulties. II - I can drink with one hand, but I have to fill the glass with less liquid to avoid spills. III - I cannot drink with one hand, I need both hands. IV - I cannot drink with my hands, I need a straw. The score is followed by "A" if tremor involves only the upper limbs, and "B" if not. Construct validity of the Glass scale was tested against the Tremor Clinical Rating Scale (TCRS) and the Bain disability scale. A second neurologist blinded to the Glass scale score assessed interrater reliability. The Glass scale appears to be a reliable and valid tool to determine tremor severity in ET. The simplicity of the scale makes it appropriate for use in routine clinical practice.

4. **H. Becka, L.M. Shulmanb, R. Dusajc, K.E. Andersond, W.J. Weinera:**

Computer skills in patients with movement disorders. Electronic communication is important in healthcare, but the level of computer proficiency among patients with neurological disorders is unknown. This study sought to determine the proportion of a movement disorder clinic population that was able to perform basic computer skills, and the effect of specific cognitive and motor features on computer proficiency.

5. **Meshack RP, Norman KE:**

A randomized controlled trial of the effects of weights on amplitude and frequency of postural hand tremor in people with Parkinson's disease. In a repeated-measures design, postural hand tremor was recorded three times in each of three weight conditions in a single session for each subject. The control condition consisted of holding a built-up spoon (108g). There were two experimental conditions: holding a weighted spoon (248 g); and holding the built-up spoon while wearing a weighted wrist cuff (470 g). Repeated-measures analyses of variance revealed no significant differences across conditions in any measure of tremor amplitude or in either measure of tremor frequency.

6. **McGruder J, Cors D, Tiernan AM, Tomlin G:**

Weighted wrist cuffs for tremor reduction during eating in adults with static brain lesions. American Journal Occupational Therapy. 2003 Sep-Oct; 57(5):507-16. This study examined whether weighting the forearm during feeding decreased tremors and increased functional feeding in adults with intention tremor caused by static brain lesions. Five individuals with various diagnoses, ages 30-81, were videotaped during 8 or 16 meal sessions, alternating treatment and control conditions within each meal. In this single-case design, treatment consisted of application of a weighted fabric wrist cuff and the baseline (control) condition employed an identical cuff with the weights removed. Dependent variables studied were time to acquire and deliver a bite, grams of food eaten, number of times food was spilled, number of times a compensatory technique was used, participant self-rating, and investigator rating of the severity of the tremor. All five participants demonstrated improvement during treatment in one or more of the dependent variables. t Tests of the means of baseline and treatment half-sessions incorporating conservative control of Type I error revealed the following statistically significant improvements under the weighted condition: Participants 3, 4, and 5 took less time to acquire a bite; Participants 4 and 5 made fewer spills; Participants 3 and 5 showed a diminished tremor. There were no statistically significant decreases in function on any variable for any participants during the weighted condition. The application of weight to the wrist of a person with upper-extremity tremor is accompanied by some functional improvement in self-feeding for some individuals. The size of benefit seems to be sensitive to the amount of weight used.

7. **PROUD EL, MORRIS ME:**

Skilled hand dexterity in Parkinson's disease: effects of adding a concurrent task. To compare the performance of people with Parkinson's disease (PD) and unimpaired participants on a timed dexterity task and to examine the effects of adding a secondary task. The number of pegs placed in the Purdue Pegboard in 30 seconds, the number of correct verbal responses for the secondary task, scores on the Manual Ability Measure-16 test of hand function and, for the group with PD, ratings on the Unified Parkinson's Disease Rating Scale. For the pegboard task, people with PD had reduced dexterity ($t=-5.289$; $P<.001$) compared with the unimpaired group. When the secondary task was added, both groups placed fewer pegs ($F(1,42)=.652$; $P=.42$). There were no differences between groups in scores for the subtraction task performed alone, but when this activity was carried out with the Purdue Pegboard Test, the number of correct responses declined only in the PD group ($F(1,42)=4.90$; $P=.032$). Manual dexterity was compromised in this group of people with mild-moderate PD when compared with an unimpaired group. When the concurrent verbal-cognitive task was added, dual-task interference occurred in both groups but to a greater extent in people with PD.

8. **BENNETT KM, MARCHETTI M, IOVINE R, CASTIELLO U.**

The drinking action of Parkinson's disease subjects. Using the ELITE system, a kinematic analysis was performed of the upper limb drinking action of nine Parkinson's disease patients and nine control subjects. The aim was to use a natural task to investigate the reported Parkinson's disease dysfunction in the performance of simultaneous and sequential movements. Subjects were required to reach 28 cm, grasp a half-filled glass and then take a sip of water. Dysfunction for simultaneous movements was supported by the finding that, in both absolute and relative terms, Parkinson's disease subjects often began to open the hand later than control subjects. Dysfunction for sequential movements was supported by the finding that Parkinson's disease subjects often showed a pause between the first ('reach-grasp') and second ('take-to-lips') parts of the drinking action. Despite these delays and pauses, the proportional organization of the action was similar for both groups. This suggested that Parkinson's disease subjects were able to compensate for the problem in activating the different components of the drinking action. The results are discussed in relation to the influence of the abnormal basal ganglia input to cortical motor regions.

9. **ALBERTS JL, TRESILIAN JR, STELMACH GE:**

The co-ordination and phasing of a bilateral prehension task. The influence of Parkinson's disease patients and control subjects performed a simultaneous bilateral reach-to-grasp task to two different sized objects and then pulled the two objects apart. The first phase of the task (reaching-to-grasp) allowed us to examine the issue that impairments in simultaneous movements for Parkinson's disease patients are seen in some tasks but not in others. It is suggested that the reason for this selective impairment is that Parkinson's disease compromises the ability to control multiple task-level degrees of freedom independently and concurrently (task-level degrees of freedom are defined as the number of independent parameters that require specification to perform the task). The first phase was used to test the hypothesis that Parkinson's disease results in a reduction of degrees of freedom that are independently controlled. It was predicted that Parkinson's disease patients would produce similar (homologous) movements of the two limbs (a symmetrical pattern) if the target objects have different accuracy requirements when they reach bilaterally to the two objects. For bilateral reaches for two different-size objects, only the control group showed reliably different patterns in the two limbs (asymmetrical pattern), while the Parkinson's disease group displayed a symmetrical pattern. These results provide support for the hypothesis that Parkinson's disease patients have a reduced capability to control multiple task-level degrees of freedom. The second phase of the task, which involved a transition from position control (reaching-to-grasp) to force control (stabilizing and pulling), was used to examine the ability of Parkinson's disease patients to make transitions between movement tasks and force control. In contrast to control subjects, Parkinson's disease patients produced staircase patterns for grip and load forces. Furthermore, a breakdown in the parallel co-ordination between grip and load force was observed for Parkinson's disease patients. These data suggest that Parkinson's disease disrupts the normal feed forward operations responsible for the co-ordination between grip and load forces.

METHODOLOGY

The study was conducted, between June 2010 to December 2010 at J.K.K.M.R.F. and URC Hospitals.

STUDY DESIGN: Randomized Control Trial (Pre-test, Post-test experimental design).

DEPENDENT VARIABLE: Tremor Activities of Daily Living Questionnaire (TADLS).

INDEPENDENT VARIABLE: Fine motor activities protocol based on manual dexterity and coordination activities.

POPULATION: Both male and female clients were taken.

DURATION: The period of the study was 6 months.

PARTICIPANTS/SUBJECTS:

A sample of 30 clients with upper extremity tremor of Essential Tremor was selected from among the movement disorder neurological patients attending department of occupational therapy in this institute and URC hospitals, meeting the following criteria. Randomly allocated to the experimental or control group, till the number of 15 subjects was reached in each group, matched for age, gender and chronic of condition. Pre-test was done for both groups separately. The Pre-test results of two groups were statistically calculated to find out the difference among the samples in the group.

The Experimental group was under occupational therapy intervention through fine motor activity protocol based on manual dexterity and coordination activities using weighted cuff, whereas the control group has not undergone any specific interventions expect using weighted cuff. After a period of two months of intervention the post-test evaluation was done and the scores are calculated and results was analysed.

INCLUSION CRITERIA:

- Age: 50 - 65 years
- Both Male and Female
- Glass Scale II – III A/B.
- Spiral Drawing – Archimedes (Rule out from other tremors)
- Clients who could follow & respond for simple commands

EXCLUSION CRITERIA:

- Age more than 65 years
- Clients with other neurological or Movement Disorders
- Glass Scale I & IV A/B
- Alcoholism/Withdrawal Syndrome

INSTRUMENTS

GLASS SCALE TEST:

Glass scale is easy and quick to administer to essential tremor patients with upper limb involvement. Using the scale involves asking the patient one question: “Over the last week, when you were sitting down at the table, how did you drink water from a glass?

Scores: I – I have no difficulties.

II – I can drink with one hand, but I have to fill the glass with less liquid to avoid spills.

III – I cannot drink with one hand, I need both hands.

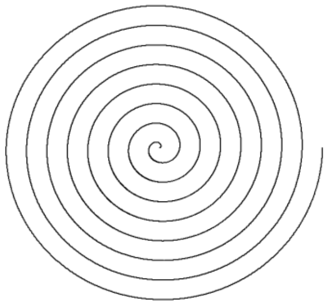
IV – I cannot drink with my hands, I need a straw.

The score is followed by “A” if tremor involves only the upper limbs, and “B” if not.

-Alexaandre Gironell, Merce Martinez-Corral, Javier Pogonabarraga, Jamie Kullisevsky.

ARCHIMEDES SPIRAL:

Demonstrate how to draw. Archimedes spiral that approximately fills ¼, of an unlined page of standard (letter) paper. The lines of the spiral should be approximately 1.3 cm (0.5 inch) apart. Then ask the subject to copy the spiral. Test and score each hand separately. Use a ballpoint pen. The pen should be held such that no part of the limb touches the table. Secure the paper on the table in a location that is suitable for the patient’s style of drawing. Score the tremor in the spiral, not the movement of the limb.



0 – Normal

1 – Slight; tremor barely visible

2 – Mild; obvious tremor

3 – Moderate; portions of figure not recognizable

4 – Severe; figure not recognizable

TREMOR ACTIVITIES OF DAILY LIVING QUESTIONNAIRE:

The Tremor activities of daily living questionnaire consist of 25 activities that could be affected by tremor. In this questionnaire patients are asked to circle a number from (1-4) that describes most accurately how easy or difficult it is to perform that activity. The sum of the scores for the each item is then converted into percentage indicating the level of tremor related disability. The higher the score, the more disabled the patient (Appendix A). – Alusi SH, Glickman S, Worthington J, et al.

MANUAL DEXTERITY:

Manual dexterity is the ability for the hands and fingers to make coordinated movements. Strong fine motor skills, such as used with writing, knitting, sewing, and other activities that involve the hands and fingers, rely on manual dexterity. In young children, manual dexterity is developed normally through routine activities that also require hand eye coordination.

COORDINATION ACTIVITIES:

Coordination activities are the coordination of small muscle movements which occur e.g., in the fingers, usually in coordination with the eyes. In application to motor skills of hands (and fingers) the term dexterity is commonly used. The abilities which involve the use of hands develop over time, starting with primitive gestures such as grabbing at objects to more precise activities that involve precise eye–hand coordination. The development of these skills allows one to be able to complete tasks such as writing, drawing, and buttoning.

PROCEDURE

The clients those who were diagnosed as essential tremor and attended the therapy in occupational therapy department of J.K.K.M.R.F and URC hospital have been selected. Informed consent was obtained from their patients and caretakers. Then the patients were asked to fill up the Tremor Activities of Daily Living Scale for conformation. The clients were asked to draw a Archimedes spiral and demonstrate the pouring of water from a glass to glass and hold the glass filled with water for a seconds. Those who are able to follow simple commands were been selected for the study. The clients were assessed with Tremor Activities of Daily Living Scale. They were randomly assigned into two groups Group A (Experimental Group) and Group B (control Group). 8 weeks therapy sessions were given to the clients. Group A received Occupational Therapy intervention of fine motor activity based on manual dexterity and coordination activities using weighted cuff and Group A were using only weighted cuff. Different levels of activities were given in each week of intervention and fine motor activities were graded from simple to complex in every week. Patients are asked to engage the protocol activities daily. Patients were asked to demonstrate the activity after every week visit of the therapist. Home visit were done for follow-up on every week end for their clarification of doubts as per request. At the end of each therapy session clients were provided with positive reinforcement. After 8 week of therapy both group were reassessed with Tremor Activities of Daily Living Scale. Results were taken for statistical analysis to find out effect of fine motor protocol based on manual dexterity and coordination activities to improve activities of daily living on upper limb tremor in both groups.

FINE MOTOR ACTIVITY PROTOCOL

Fine Motor Activity Protocol based on Manual Dexterity and Co-ordination Activities will be given only for Experimental Group with Weighted Cuff.

FINE MOTOR ACTIVITIES	MANUAL DEXTERITY	CO-ORDINATION ACTIVITIES
Week # 1	"Card Sorting"	"Putting mushroom pegs in peg board"
Week # 2	"Paper mat weaving"	"Putting coins in connect 4 game"
Week # 3	"Make small shapes from theraputty"	"Hit the balloon with medium sized balloon"
Week # 4	"Lacing the wooden wheel"	"Soft ball throwing and catching"
Week # 5	"Cutting papers for making geometric shapes"	"Joining sensy links & tearing the waste newspaper"
Week # 6	"Knott making on small rope"	Putting the washers on the bolt and screw the nut.
Week # 7	"Using tweezers to pick up small objects"	"Putting the string tied ring in the nail"
Week # 8	"Typing a message in a mobile"	"Bead Stringing"

Essential Tremor Evaluation – Glass Scale Evaluation

COORDINATION ACTIVITIES

Fine Motor Activity Protocol – Putting Washer & Nut in Bolt Activity

Fine Motor Activity Protocol – Connect 4 Activity

COORDINATION ACTIVITIES CONT...

Fine Motor Activity Protocol – Linking Activity

Fine Motor Activity Protocol – Tearing Paper

MANUAL DEXTRETITY

Fine Motor Activity Protocol – Card Sorting Paper

Fine Motor Activity – Geometric Shape Cutting Activity

MANUAL DEXTRETITY

Fine Motor Activity Protocol – Mat Weaving Activity

Fine Motor Activity Protocol – Mobile SMS Typing

DATA ANALYSIS

Two tailed paired t test was used to find out the changes in the Tremor activities of daily living questionnaire score within the group.

An independent group t test was used to compare the changes that occurred in the Tremor activities of daily living questionnaire score, between the two groups.

The null hypothesis was tested with level of significance at 0.05

All the statistical data analyses were carried out using the software statistical package for social sciences.

TREMOR ACTIVTIES OF DAILY LIVING SCALE

Table 1: Correct Score (Standard) (Experimental Vs Control)

	Correct score (Standard)			
	Experimental		Control	
	Pre	Post	Pre	Post
	79	65	84	74
	82	67	92	89
	81	69	85	79
	91	71	91	85
	80	65	81	72
	89	64	81	74
	83	60	83	76
	90	72	90	77
	85	57	92	83
	87	73	89	73
	81	56	89	72
	86	63	94	75
	88	69	95	82
	80	67	93	81
	84	64	87	77
Mean	84.4	65.46	88.4	77.93
Std dev	3.94	5.08	4.65	5.10
t-test	11.42		5.88	
df	14		14	
Significance	P<0.05 Significant		P>0.05 Not Significant	

Table 2 (A-1): Pre assessment (Experimental Vs Control)

	Pre-test				
	Mean	**Std dev**	**df**	**t**	**significance**
Experimental	84.4	3.94			P>0.05
Control	88.4	4.65	28	0.33	Not Significant

Table 2 (A-2): Post assessment (Experimental Vs Control)

	Post-test				
	Mean	**Std dev**	**df**	**t**	**significance**
Experimental	65.46	5.08			P<0.05
Control	77.93	5.10	28	9.44	Significant

Chart 1 (A-1): Correct Score (Experimental)

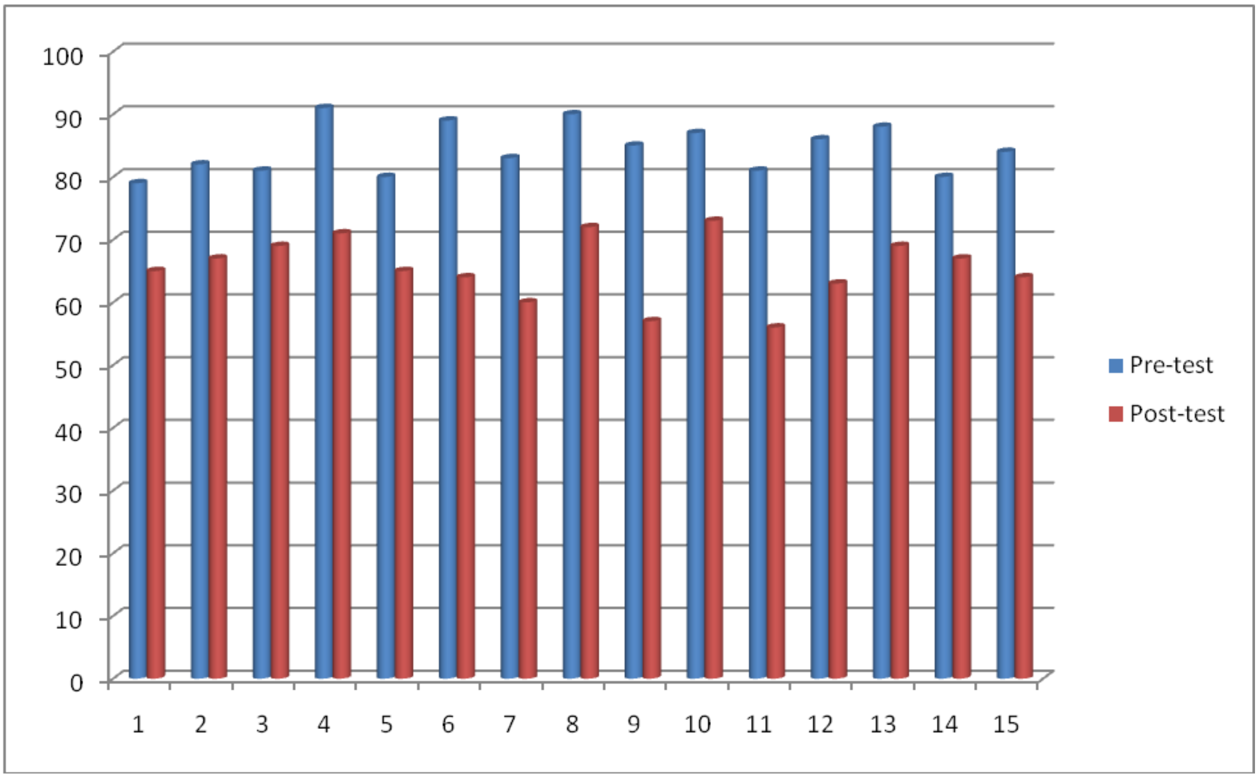
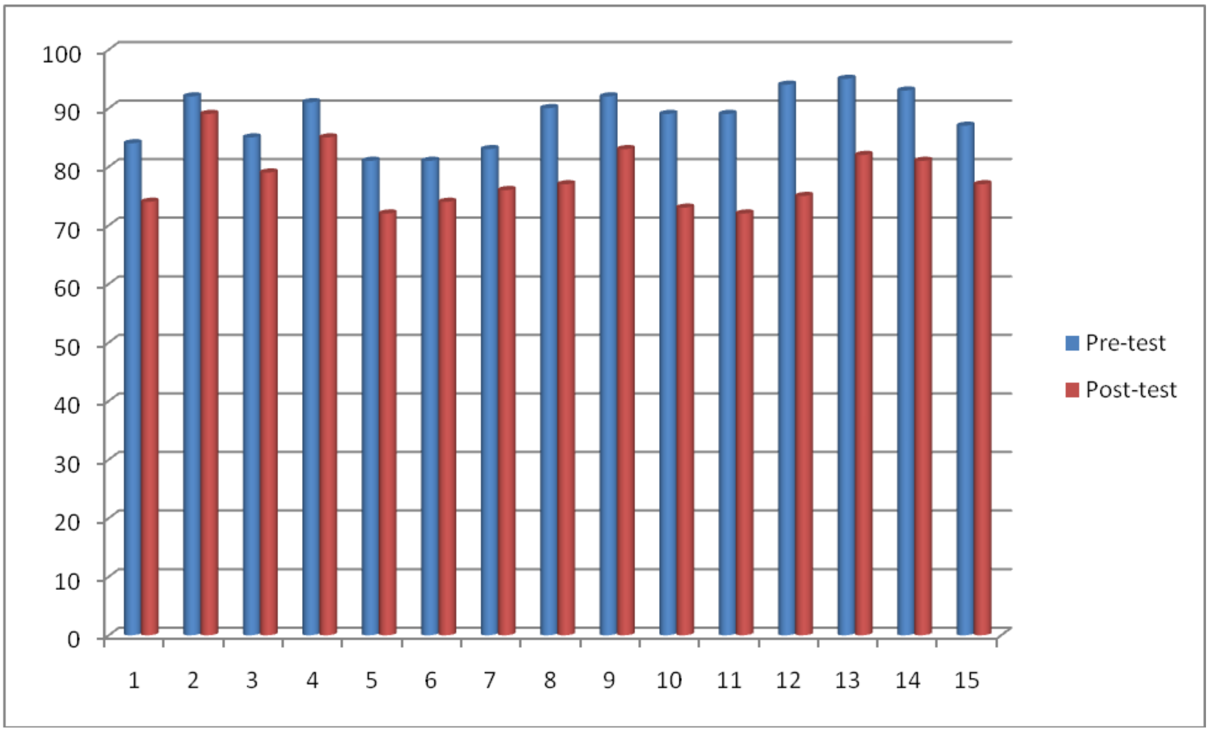


Chart 1 (A-2): Correct Score (Control)



The charts 1 (A-1) and 1 (A-2) supporting the table 2 (A-1) exhibits clearly that the experimental group has an improved performance in the evaluation of correct score after intervention, where as the table 2 (A-2) control group do not show such a improvement in their performance.

HYPOTHESIS TESTING: At the level of significance, which was set as 0.05, the calculated t value lies outside the upper limit of critical value for t scores of Tremor Activities of Daily Living Questionnaire Scale. Hence, the null hypothesis was rejected. Alternatively, the proposed hypothesis is accepted. This suggests that there is a greater improvement in activities of daily living among upper extremity tremor of Essential Tremor in Geriatric Population, when the fine motor activity protocol based on the manual dexterity and coordination activities of Occupational Therapy Intervention.

RESULTS

The master chart (Appendix – A) shows the Tremor Activities of Daily Living Questionnaire, Details scores of individual for both experimental group and control group. The analysis of data depicts the following descriptive statistic and test results.

The paired -‘t’ test was used to analyze the difference in the score of tremor activities of daily living within the group. The results were represented in the tables.

DISCUSSION

Occupational therapy strategies depends primarily in systematic gradation and training of task parameters and functional adaptation which has yielded an improvement in the underlying upper extremity tremor and provided much benefit for community living. The findings say that improvement of functional independence and reduce the level of upper extremity tremor after intervention.

In this study Student Paired ‘t’ Test for within group showed significant improvement in all three outcome measures i.e. TADLS. After giving Fine Motor Activity Protocol and Using Weighted Cuff (Group A) and Using Only Weighted cuff (Group B), the difference in the mean scores of the groups in outcome measure i.e. Tremor Activities of Daily Living scores in the group B (Using only Weighted Cuff) when compared to the group A (Fine Motor Activity Protocol and using Weighted Cuff).

Data from this study indicates that the subject in Fine Motor Activity Protocol group had 32.43% improvement on TADLS, after 8 weeks of Therapy. It indicates that group A has a significant effect in improving motor ability of upper extremity tremor motor function in essential tremor patients.

One purpose of rehabilitation after Essential Tremor is to enhance use of the upper limb tremor while fine motor protocol and using weighted cuff. In this study the task oriented approach has focused to improve the upper extremity motor function in Essential Tremor patients. The improvement shown after using fine motor protocol in Group B is also found to be statistically significant from the result of Student Paired‘t’ Test.

In the study it was found that after 8 weeks of treatment group B was better improvement than group B.

The results of Student Paired ‘t’ Test were statistically significant.

CONCLUSION

There is a significant improvement in upper extremity essential tremor in geriatric population who receive fine motor activity protocol based on manual dexterity and coordination activities of occupational therapy intervention.

From the study, there is a significant improvement in upper extremity essential tremor in geriatric population who receive fine motor activity protocol based on manual dexterity and coordination activities of occupational therapy intervention.

LIMITATIONS

- Small sample size makes it difficult to generalize these finding.
- Population sample was not representative of all clients, only clients who know English were selected.
- The effect of the study might have influenced by normal routine activity.
- The effect of difference between both genders not examined.
- Follow up studies to detect the retention of effect was not done.

SUGGESTIONS

- Additional studies of long term benefits of the activities based on the manual dexterity and coordination activities are warranted.
- Future efforts also need to examine the effectiveness of activity based on the manual dexterity and coordination activities on large group.
- Duration of intervention can be increased to have still good improvement.
- Effect can be taken to find the effect of individual clients on activities of daily living.
- Future studies require translating the scale into local language so that more clients can be included in the studies.

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5. All Basic Occupational Therapy for Physical dysfunction.

WEBSITE:

1. www.wemove.org
2. www.tremornetwork.org
3. www.ietf.org
4. www.essentialtremor.org
5. www.prd-journal.com
6. www.tremoraction.org
7. www.chg.duhs.duke.edu/patients/tremor.html
8. www.google.co.in
9. www.pubmed.com
10. www.sciencedirect.com
11. www.us.elsevierhealth.com
12. www.stopessentialtremor.com
13. www.movmentdisorders.org
14. www.parkinsons.northwestern.edu/tremor.com
15. www.winkssoftware.com

APPENDIX

Appendix-A

MASTER CHART OF EXPERIMENTAL GROUP 1

(Wearing Weighted Cuff and Following Fine Motor Activity Protocol)

S.No	Name	Age	Sex	Glass Scale Score	Archimedes Spiral Score	TADLS	
						Pre-Test	Post-Test
1.	Murali	52	M	II A	1	79	65
2.	Surendran	55	M	II B	2	82	67
3.	Natarajan	60	M	II B	2	81	69
4.	Krishnan	63	M	III B	3	91	71
5.	Kannan	51	M	II B	2	80	65
6.	Venkatesan	64	M	III A	3	89	64
7.	Nagaraj	59	M	III B	2	83	60
8.	Saravanan	65	M	III B	3	90	72
9.	Shankarraman	62	M	III B	2	85	57
10.	Surya Prakash	58	M	III A	3	87	73
11.	Krishnaveni	53	F	II B	1	81	56
12.	Mariammal	64	F	III A	3	86	63
13.	Geetha	56	F	III B	2	88	69
14.	Janaki	57	F	II A	1	80	67
15.	Nagammal	62	F	III B	2	84	64

MASTER CHART OF CONTROL GROUP 2

(Wearing Only Weighted Cuff and Essential Tremor Education)

S.No	Name	Age	Sex	Glass Scale Score	Archimedes Spiral Score	TADLS	
						Pre-Test	Post-Test
1.	Arunachalam	54	M	II B	2	84	74
2.	Karunakaran	63	M	III B	3	92	89
3.	Velmurugan	61	M	III A	2	85	79
4.	Vendan	64	M	III B	3	91	85
5.	Sivaraman	57	M	II A	2	81	72
6.	Rajasekaran	53	M	II B	2	81	74
7.	Sanmugam	50	M	II A	2	83	76
8.	Rathnavel	65	M	III A	3	90	77
9.	Ganeshan	62	M	III B	3	92	83
10.	Sivanandan	59	M	III A	2	89	73
11.	Kavitha	56	F	II B	2	89	72
12.	Vijayalakshmi	60	F	III B	3	94	75
13.	Annapurni	65	F	III A	3	95	82
14.	Solaiammal	64	F	III B	3	93	81
15.	Lakshmi	52	F	II A	2	87	77

Appendix-B

"TREMOR ACTIVITIES OF DAILY LIVING QUESTIONNAIRE"

(Please read carefully. For each item circle the number which best describes how easy or difficult it is for you to perform the activity)

1. Able to do the activity without difficulty
2. Able to do the activity with little effort
3. Able to do the activity with a lot of effort
4. Cannot do the activity by yourself

How well are you able to................?

S. NO.	TREMOR ACTIVITIES OF DAILY LIVING	RATINGS			
1.	Cut food with a knife and fork	1	2	3	4
2.	Use a spoon to drink soup	1	2	3	4
3.	Hold a cup of tea	1	2	3	4
4.	Pour milk from a cup or carton	1	2	3	4
5.	Wash and dry dishes	1	2	3	4
6.	Brush your teeth	1	2	3	4
7.	Use handkerchief to blow your nose	1	2	3	4
8.	Have a bath	1	2	3	4
9.	Use the lavatory	1	2	3	4
10.	Wash your face and hands	1	2	3	4
11.	Tie up your shoe laces	1	2	3	4
12.	Do up buttons	1	2	3	4
13.	Do up a zip	1	2	3	4
14.	Write a letter	1	2	3	4
15.	Put a letter in a envelope	1	2	3	4
16.	Hold and read a newspaper	1	2	3	4
17.	Dial a telephone	1	2	3	4
18.	Make yourself understood on the phone	1	2	3	4
19.	Watch the television	1	2	3	4
20.	Pick up your change in a shop	1	2	3	4
21.	Insert an electric plug into a socket	1	2	3	4
22.	Unlock your front door with the key	1	2	3	4
23.	Walk up and down the stairs	1	2	3	4
24.	Get up out of an armchair	1	2	3	4
25.	Carry a full shopping bag	1	2	3	4
	SUB TOTAL				
	TOTAL				

Appendix-C

FINE MOTOR ACTIVITY PROTOCOL

Fine Motor Activity Protocol based on Manual Dexterity and Co-ordination Activities will be given only for Experimental Group with Weighted Cuff.

FINE MOTOR ACTIVITIES	MANUAL DEXTERITY	CO-ORDINATION ACTIVITIES
Week # 1	“Card Sorting”	“Putting mushroom pegs in peg board”
Week # 2	“Paper mat weaving”	“Putting coins in connect 4 game”
Week # 3	“Make small shapes from theraputty”	“Hit the balloon with medium sized balloon”
Week # 4	“Lacing the wooden wheel”	“Soft ball throwing and catching”
Week # 5	“Cutting papers for making geometric shapes”	“Joining sensy links & tearing the waste newspaper”
Week # 6	“Knott making on small rope”	“Putting the washers on the bolt and screw the nut”
Week # 7	“Using tweezers to pick up small objects”	“Putting the string tied ring in the nail”
Week # 8	“Typing a message in a mobile/laptop”	“Bead Stringing”

Appendix-D

CONSENT FORM

J.K.K. Munirajah Medical Ressearch Foundation
College of Occupational Therapy

Title: "**Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Tremor of Essential Tremor in Geriatric Population."**

Name of the Student: K. Naresh Babu
E-mail: knb_bot82@yahoo.com

Mr. K. Naresh Babu has requested me for the participation of my family member in his study **"Effect of Fine Motor Activities to Improve Activities of Daily Living on Upper Extremity Essential Tremor in Geriatric Population"**. I was explained that Mr. K. Naresh Babu is doing a study for his thesis in the partial fulfillment of the requirements for the degree of Master of Occupational Therapy (Advanced in Neurology). I am convinced that participation in his study will neither harm my family member, nor deprive him of his usual treatment. Further, I agree to the procedures to be followed during the study period and will spare the time as requested to me. I also understand that I will have the freedom to pull out my family member from the study.

Date: **Signature of the Guardian**

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27-12-10

TO WHOM IT MAY CONCERN

This is to certify Mr. K. Naresh Babu, bonafide student of JKK Munirajah College of Occupational Therapy doing Master of Occupational Therapy (Advanced Occupational Therapy in Neurology) 2009-2011 batch, has completed his study on " EFFECT OF FINE MOTOR ACTIVITIES TO IMPROVE ACTIVITIES OF DAILY LIVING ON UPPER EXTREMITY ESSENTIAL TREMOR IN GERIATRIC POPULATION" at URC Hospitals, Erode.

Duration: 14-06-10 to 27-12-10

Director (In-charge),

URC Hospitals, Erode

12/29, State Bank Road, Behind Central Theatre, Erode - 638 001.
Ph : 97501 25555 E-mail : ask@urchospitals.com web : www.urchospitals.com

URC
HOSPITALS
an ISO 9001:2008 certified

29-12-10

TO WHOM IT MAY CONCERN

This is to certify Ms. Bairavi, bonafide student of JKK Munirajah College of Occupational Therapy doing Master of Occupational Therapy (Advanced Occupational Therapy in Neurology) 2009-2011 batch, has completed her study on "The effectiveness of Hand-arm Bimanual Intensive Therapy (HABIT) on upper extremity functional recovery in Hemiplegic patients" at URC Hospitals, Erode.

Duration: 18-06-10 to 29-12-10

Director (In-charge),
URC Hospitals, Erode

12/29, State Bank Road, Behind Central Theatre, Erode - 638 001.
Ph : 97501 25555 E-mail : ask@urchospitals.com web : www.urchospitals.com