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Original Article

Effect of Unaffected Upper Extremity Strengthening on Motor Performance of Affected Upper Extremity in Spastic Hemiplegic Cerebral Palsy

Singh Meenakshi *, Saleem Eram**

Abstract

Introduction: In Cerebral Palsy the areas of the brain affected are those associated with the motor systems, which when damaged, impair control of movement. The difficulties of a child with Cerebral palsy are caused with either damage to or faulty development of the motor areas of the brain that disrupts the brain's ability to control movement and posture producing poor coordination, poor balance, or abnormal movement patterns. Over the decades, studies related to intermanual transfer have been performed in normal subject. The main objective of this study is "to find out the effect of strengthening of unaffected upper extremity on motor performance of affected upper extremity in spastic hemiplegic cerebral palsy". **Methodology:** 20 spastic hemiplegic CP subjects aged 5-15 years, IQ > 60 were taken and divided in two groups. Control group was given Conventional exercises for affected upper extremity and experimental group was given strengthening and co-ordination training to unaffected upper extremity while affected limb received the same treatment as control group. Intervention was given for three days a week for 3 weeks.The subjects were assessed using Purdue Pegboard test and Abilhand assessment tool before and after the intervention. **Results:** The experimental group showed significant effect on purdue pregboard task and abilhand tool after the training. **Discussion:** Intermanual transfer of training does exist in patients with spastic hemiplegic CP leading to improvement in motor performance.

Keywords: Spastic CP; Inter manual transfer; Pegboard task; Abilhand assessment tool.

Introduction & Background

Cerebral Palsy is a motor disorder that appears in children before the age of three. The condition is generally believed to be caused by damage or trauma to the brain before it is has fully developed. In Cerebral Palsy the areas of the brain affected are those associated with the motor systems, which when damaged, impair control of movement. The difficulties of a child with Cerebral palsy are not caused by problems with their muscles or nerves, but rather with either damage to or faulty development of the motor areas of the brain that disrupts the brain's ability to control movement and posture producing poor coordination, poor balance, or abnormal movement patterns.[1] Among various physical impairments, loss of hand functions has a profound effect on the individual's life.[2] *In the entire upper limb the percentage of functional importance of wrist and hand is 60%.*

Contractures of the elbows, for example, may interfere with the ability to position the hands in space. Mild to moderate wrist contractures may interfere with grasp and release and limit use of the affected hand as an assisting hand. The ability of an individual to accomplish everyday activities depends on the anatomical integrity, sensation, co-ordination and strength of his hands.[2] Many therapeutic strategies such as NDT, MRP, and PNF have been used to improve hand function. These strategies focus on the impaired segment to facilitate its recovery.

A few known Neuropsychological theories/ models suggest transfer of training from one

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hand to the other hand, which are known as Inter manual transfers.

It is well known that practice of novel movements with one hand affects subsequent performance of the other hand.[3]

However, over the decades, studies related to intermanual transfer have been performed in normal subject, there is no published evidence suggesting effectiveness of intermanual transfer in patients of hemiplegic cerebral palsy. But the theories suggesting intermanual transfer are strong enough to explore their effectiveness in patients with hemiplegic CP. Hence we decided on this particular concept.

Bert Steenbergen, Jeanne Charles and Andrew M. Gordon examined unimanual and bimanual fingertip force control during grasping in children with hemiplegic cerebral palsy (CP). Participants lifted, transported and released an object with one hand or both hands together in order to examine the effect on fingertip force control for each hand separately and to determine whether any benefit exists for the affected hand when it performed the task concurrently with the less-affected hand. They observed close synchrony of both hands when the task was performed with both hands, despite large differences in duration between both hands when they performed separately.[4] Hanajima R, *et al* investigated interhemispheric interactions between the human hand motor areas using transcranial cortical magnetic and electrical stimulation. A magnetic test stimulus was applied over the motor cortex contra lateral to the recorded muscle (test motor cortex), and an electrical or magnetic conditioning stimulus was applied over the ipsilateral hemisphere (conditioning motor cortex). They investigated the effects of the conditioning stimulus on responses to the test stimulus. These results were compatible with surround inhibition at the motor cortex.[5]

Objective

In spite of the fact that intermanual training being a well-established theory, there are no studies supporting/ refuting its use in patients of hemiplegic CP. If found effective, intermanual training can have significant therapeutic implications in patients with hemiplegic CP. Hence the study was planned. The main objective of this study is "to find out the effect of strengthening of unaffected upper extremity on motor performance of affected upper extremity in spastic hemiplegic cerebral palsy".

Hypothesis

Null hypothesis

There will not be any statistically significant effect of strengthening of unaffected upper extremity on motor performance of affected upper extremity in spastic hemiplegic cerebral palsy.

Alternate hypothesis

There will be a statistically significant effect of strengthening of unaffected upper extremity on motor performance of affected upper extremity in spastic hemiplegic cerebral palsy.

Methodology

20 spastic hemiplegic cerebral palsy subjects, aged 5-15 years were taken from a special school located in Delhi.

Inclusion Criteria

1. Hemiplegic Cerebral Palsy
2. Age 5-15 yrs.
3. I.Q. > 60
4. Full range of motion in upper limb (within normal limits).
5. Ashworth's scoring ≤ 1
6. Unaffected upper limb with MMT Grade 5

Exclusion Criteria

1. Any associated cardiac disease
2. Use of orthotic device in affected limb.
3. Sensory impairment in upper limb.

Procedure

After selection of subjects as per the inclusion criteria, the subjects were divided in two groups of 10 subjects each: Control group (group) and Experimental group (group).

For the control group the conventional Physiotherapy regime was given to affected extremity for duration of 3 weeks (3days a week). Therapy consisted of Passive stretching, PROM, Active stretching, Electrical stimulation to hand Muscles, PNF techniques-Hold Relax, Contract Relax, Agonist Inhibition and ADL Activities using Motor Relearning Program (MRP).

Experimental group was given Physiotherapy intervention for both the extremities. Affected upper extremity was given same regimen as the Control group. Unaffected extremity was given strengthening exercises using clay(putty), theraband, rubber bands, Hand gripper and squeezing ball and co-ordination exercises using movements of finger to nose, finger to finger, finger to therapist's finger, piano playing Movements, making circle with thumb and each finger one-by-one.

The hand function assessment of both the groups was taken before and after the intervention of 3 weeks by using the:

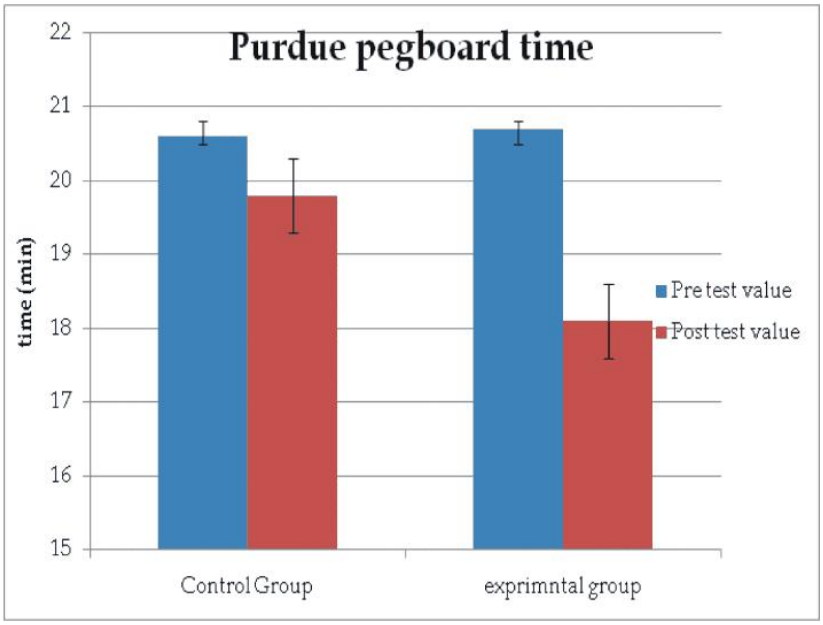
i) *Peg board Test:* It consisted of 6 different shapes, with 5 blocks of each shape, making it a pegboard of 30 blocks. Children were asked to lodge and dislodge with affected hand.Time was noted (in approximate minutes).

ii) *Abilhand Assessment Tool:* It is a Manual Ability Measure Scale, consisting of 21 tasks, which the parents were asked to fill and categorize whether the child did the particular task with ease, difficulty or impossible to do. The no. of activities done with ease were noted before and after the intervention.

Data Analysis & Results

The result for comparison "Between Pre-test & Post-test values of Control Group" using Paired t-Test showed no statistically significant difference in the values of time taken to complete the pegboard task. The pre test time was 20.6 min and post test time was 19.8 min. The result for comparison "Between Pre-test & Post-test values of Experimental Group"

Figure 1: A Child Performing the Pegboard Task



showed significance at 0.05 level of Paired t-Test. The pre test time was 20.7 min and post test time was 18.1 min.

Abilhand assessment tool showed increase in the number of tasks which can be done with ease before and after the intervention in two groups. Prior to intervention, children were able to do 11 tasks with ease in both the groups. However, after intervention, 8 out of 10 children in control group were able to do 15 tasks with ease and 9 out of 10 children in experimental group were able to do 18 tasks with ease.

Discussion

The main objective of this study was to find out the "effect of strengthening of unaffected upper extremity on motor performance of affected upper extremity in spastic hemiplegic cerebral palsy".

We used a variant of the pegboard task which is widely used in Neuropsychology for examination of motor functions.[6,7] Although this task is associated with a variety of functions, it is definitely a specific response. Previous Neuroimaging studies have shown that motor tasks triggered or guided by visual cues evoked strong cortical activation bilaterally in the ventral and dorsal premotor cortex(vPMC and dPMC), in the left sensorimotor (M 1 & S 1), in the left supplementary motor cortex(SMA), bilaterally in the inferior lobe, in the right inferior cerebellum. And in the left ventro lateral thalamus.[8-11] These findings highlight the fact that the pegboard task is most likely accompanied by distributed activation in bilateral fronto parietal network., the cerebellum, the basal ganglia and the thalamus. The distributed activation requires time consuming intrahemispheric and interhemispheric transfer of information and also time consuming process within each node of this network. The results of our study can be analyzed against the backdrop of this information.

The unaffected hand in the experimental group was subjected to 9 training sessions of 20 minutes each. There was significant reduction in the mean time taken to complete the pegboard task from 20.7min. to 18.1min. Therefore one might assume that some kind of interhemispheric transfer had occurred.

As mentioned, the pegboard task is a typical visuomotor task most likely accompanied by neural activities bilaterally in the vPMC and dPMC. The critical part of the task is not the movement itself, which is controlled by the

primary motor cortex, but rather the adjustment of movement parameters (eg. Distance between the holes, size of the pegboard) by means of visual information. According to the above mentioned brain imaging data, it is known that visual information associated with motor functions is transferred from the visual cortex bilaterally via the dorsal stream to the dPMC. Thus if say, in the right hand when the pegboard task is performed unimanually (causing strong activations with the left dPMC and left M l), the right dPMC and possibly the adjacent right M l is also activated. Learning to perform the pegboard task the right hand will therefore automatically lead to an improvement of visual motor associations in both hemispheres, in which case performing the motor task with the untrained hand will rely on improved visual motor associations.There also may be further process such as training program located in M l or PMC or the interhemispheric exchange of information between both PMCs which are also stimulated.

In the control group, there was a no statistically significant difference in the mean time taken to complete the task i.e. the mean value reduced from 20.6min. to 19.8min. Though statistically insignificant, the difference in the mean time between initial and final reading could be due to conventional PT regimen and familiarization of the task.

As the results observed for the experimental group are statistically significant, therefore we can deduce that just being familiar with the task or the conventional PT regimen could not have been sufficient to improve task performance so significantly.These results demonstrate that the intermanual task performance exists in the patients with spastic hemiplegic cerebral palsy. It is essential to have training period and just familiarization with a task alone is not sufficient to improve performance in the affected upper extremity.

Future Research

The concept of intermanual transfer has been well established in normal subjects but there is little evidence supporting its use in patient's population. This study can be carried forward by conducting related studies in different neurological patient's population. A study also needs to be conducted to evaluate transfer of training from subdominants to weak/impaired dominant hand. Studies can also be conducted by varying the treatment duration, nature of task, complexity, to name a few.

Relevance to Clinical Practice

The results of the study can be applied in clinical settings to improve performance of the affected upper extremity in patients with spastic hemiplegic cerebral palsy.

Conclusion

The "Null hypothesis" is rejected and the results of the study indicate the following:

1. Training on the pegboard task improves task performance.
2. Intermanual transfer of training does exist in patients with spastic hemiplegic CP.
3. Familiarization of the task performance on the affected hand may not be clinically significant.

Limitations of the Study

1. The total sample size in the study is small.
2. The total duration of the study is very short.
3. The study is done on the students of DWSMR only. This makes the sample source very limited and confined.

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Original Article

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Analyzing Strength & ROM Variations of Shoulder Complex in Mastectomy Subjects: A Pilot Study

Alifiya Bootwala*, Lipy Bhat, Abhishek Sharma**, Ravinder Narwal****

Abstract

Background and Objective: Impaired shoulder function after mastectomy and axillary dissection for breast carcinoma (Ca) is a well know problem. Researchers have analyzed group muscle strength of the shoulder joint and postulated that there is significant reduction of muscle strength around shoulder joint .So the following study was aimed at analyzing individual muscle strength and ROM of shoulder complex .Result of this study will help in formulating evidence based shoulder rehabilitation protocol for subjects undergoing modified radical mastectomy (MRM). **Method:** This experimental study was based on eleven subjects undergoing modified radical mastectomy.They were selected on basis of inclusion & exclusion criteria from the population of 30 subjects . Pre surgical reading for muscle strength and ROM were taken and compared post surgically after the removal of post-op drain. Readings for muscle strength were taken by a Kendall MMT technique and ROM by a half circle metal universal goniometer. **Results:** Significant reduction was found in ROM & strength of shoulder complex after MRM. Most significant reduction in ROM found in abduction (67.35±29.63) & flexion (59.77±1.70). Muscle strength were found for pectoralis major (3.54±1.36) (U.F), (4.27±1.34) (L.F), pectoralis minor (3.81±1.16), serratus anterior (4.18±1.60), Latissimus dorsi (3.90±1.37), & rhomboids (2.54±1.21) respectively. **Conclusion:** Significant reduction in muscle strength & ROM of shoulder complex occurs after MRM. Therefore individually tailored & specifically designed rehabilitation protocol will help in improving quality of life of breast cancer subjects.

Key words: Muscle strength; ROM; Breast Ca; Mastectomy; MRM; Shoulder dysfunction; Rehabilitation.

Introduction

Breast cancer is commonest malignancy in women & comprises 18% of all female cancers and 1 million new cases in world each year are added. According to Indian council of medical and research (ICMR), cancer of breast is most frequent site of cancer among urban females accounting for about 40% of all cancers. Presently 75,000 new cases occur in India each year. In united kingdom the incidence among women aged 50 approaches 2 per 1000 women per year and about 15 will have had a diagnosis made before the age of 50, giving a prevalence of breast cancer of nearly 2%.[1,2]

Breast cancer detection & management have undergone dramatic changes over recent decades, women are increasingly diagnosed with early stage disease leaving them with several treatment choices ranging from breast conserving options to mastectomy. Mastectomy is the procedure for removal of breast and modified radical mastectomy is the most commonly used procedure now a days which includes transverse or slightly oblique incision that extends to a point slightly beyond edge of latissimus dorsi muscle. It involves removal of entire breast, chest fascia and axillary lymph nodes but pectorals remain intact as there is retraction of these muscles to provide excellent exposure while minimizing danger of traction injury to neurovascular structures supplying these muscles.[3]

Mastectomy procedures cause many complications despite improved surgical

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techniques. Its consequences are lymphedema, seroma formation, decrease in arm mobility and strength of shoulder complex, difficulties related to post-op scar, distinct adverse changes in body posture of women mainly asymmetry of trunk, altered position of scapula on operated side as well as forward leaning of trunk.[4]

Several physical therapy measures commonly used are general ROM and strengthening exercises of affected upper extremity, complex decongestive physical therapy (CDPT) for lymphoedema which includes meticulous skin and nail care, manual lymphatic drainage, low stretch multilayer bandaging along with active ROM exs with bandage. Other treatment techniques are directed towards postural correction, breathing exs to increase efficiency of respiratory system and psychological councelling.[5]

Various researches have shown that there is significant reduction of muscle strength around shoulder joint after mastectomy.[6] But there is lake of depth in literature regarding evidence that can shows exact deterioration in individual muscle strength in mastectomy subjects.

Therefore this study aims at evaluating individual muscle strength and range of motion of shoulder complex in pre and post modified radical mastectomy subjects to find out exact deterioration which will help in upgrading and designing specific & structured evidence based rehabilitation protocol for mastectomy subjects.

Methodology

a) Inclusion Criteria

- Subjects between the age group of 28 to 56 years
- Subjects undergoing modified radical mastectomy
- Subjects undergoing MRM on one side

b) Exclusion Criteria

- Any neurological condition affecting spine & shoulder joint. Eg:-Cervical radiculopathy, Disc prolapse.
- Any orthopaedic deformity & complications of upper quadrant. Eg:-Frozen shoulder, recent surgery & fracture.
- Uncooperative patients.

Instrumentation

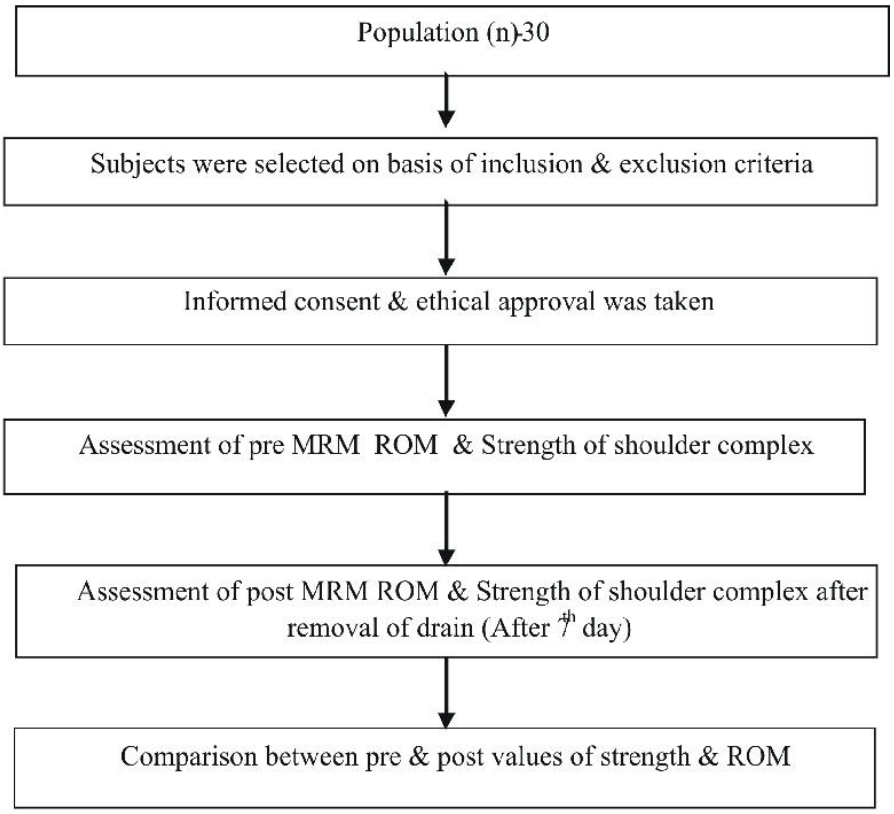
- Half circle metal goniometer
- Couch
- Stool
- Towel roll

Procedure

On the basis of inclusion and exclusion criteria eleven subjects were selected. Informed consent & ethical approval was taken. Pre MRM strength & ROM of shoulder complex were assessed using MMT (Acc. to Kendall grading) & goniometer respectively. ROM were measured for shoulder Flexion, Extension, Abduction, Horizontal adduction, Medial & Lateral rotation & MMT of following muscles were done:- Upper, Middle & Lower trapezius, Rhomboids, Serratus anterior, Pectoralis minor, Pectoralis major (Upper &Lower fibers), Latissimusdorsi, Middle deltoid & Supraspinatus, Anterior deltoid, Posterior deltoid, Teres major & Subscapularis, Teres minor & Infraspinatus and Coracobrachialis. Post MRM after removal of drain (After 7th day) strength & ROM were assessed again & at the end comparison between pre & post values of ROM & MMT were done & was evaluated. A stretching & stregthing exercise protocol was given to the subjects after the assessment.

Protocol

ROM of shoulder complex was measured using half circle universal goniometer &



method of measuring ROM was as follows:

a) Flexion: Normal range:- 0°-180°

- *Testing position:* Supine over the couch with knees flexed & palm faces the trunk.
- *Goniometer alignment:* Fulcrum over the lateral aspect of greater tubercle , proximal arm in line with midaxillary line of thorax & distal arm with the lateral midline of humerus

b) Extension: Normal range: 0°-60°

- *Testing position:* Prone over the couch/Standing
- *Goniometer alignment:* Fulcrum over the lateral aspect of greater tubercle, proximal arm in line with midaxillary line of thorax & distal arm with the lateral midline of humerus.

c) Abduction: Normal range: 0°-180°

- *Testing position:* Supine over the couch with knees flexed & palm of the hand faces the ceiling
- *Goniometer alignment:* Fulcrum close to anterior aspect acromial process, proximal arm is parallel to anterior aspect of sternum & distal arm with the anterior midline of humerus.

d) Horizontal adduction: Normal range: 0°-120°

- *Testing position*: Sitting on stool
- *Goniometer alignment*: Fulcrum over the acromion, proximal arm parallel to floor in line with neck & distal arm with the midline of humerus.

e) Medial Rotation: Normal range: 0°-70°

- *Testing position*: Supine over the couch with arm being tested in 90 degrees of shoulder abduction & forearm perpendicular to supporting surface such that palm of hand faces the feet. Towel roll or pad was placed under the humerus
- *Goniometer Alignment*: Fulcrum over the olecranon process, proximal arm perpendicular to floor & distal arm in

line with the ulna

f) Lateral Rotation: Normal range: 0°-90°

- *Testing position*: Supine over the couch with arm being tested in 90 degrees of shoulder abduction & forearm perpendicular to supporting surface such that palm of hand faces the feet. Towel roll or pad was placed under the humerus
- *Goniometer Alignment*: Fulcrum over the olecranon process, proximal arm perpendicular to floor & distal arm in line with the ulna[7,8]

The MMT of individual muscles of shoulder complex was analysed according to Kendall's method.

Data Analysis

Statistics were performed using Graph pad & Statistical software package (SPSS) version 17. Significance level was set at ≤0.05 and confidence interval was 95%. Paired "t" was used to analyse & compare ROM & strength of shoulder complex pre & post MRM. To determine differences between variables of

Table 1: Comparison of MMT Pre & Post MRM by Paired "t" test

VARIABLES	PRE (M ± SD)	POST (M ± SD)	" t " VALUE	"p" VALUE
Upper trapezius &Levator scapulae	9.81 ± 0.60	9.63 ± 1.20	1	0.341
Middle trapezius	7.81 ± 1.60	5.72 ± 1.10	5.33	0.0001
Lower trapezius	7.45 ± 1.91	5.63 ± 1.02	3.76	0.004
Rhomboids	7.45 ± 1.75	4.90 ± 0.70	6.95	0.0001
Serratus anterior	9.54 ± 1.21	5.36 ± 1.28	8.66	0.0001
Pectoralis minor	9.18 ± 1.47	5.36 ± 1.28	10.84	0.0001
Pectoralis major (U.F)	9.54 ± 0.82	6 ± 1.61	8.59	0.0001
Pectoralis major (L.F)	9.18 ± 1.53	4.90 ± 0.83	10.51	0.0001
Latissimus dorsi	8.63 ± 1.43	4.72 ± 0.64	9.42	0.0001
Middle deltoid & Supraspinatus	9.54 ± 0.68	6.72 ±1.10	10.69	0.0001
Anterior deltoid	9.36 ± 0.80	7 ± 1.09	5.75	0.0001
Posterior deltoid	9.45 ± 0.93	8 ± 1.34	4.27	0.002
Teres major & Subscapularis	8.81 ± 1.47	7.27 ± 1.42	4.22	0.002
Teres minor & Infraspinatus	8.18 ± 2.08	6.27 ± 1.48	4.37	0.001
Coracobrachialis	9.45 ± 0.82	8.36 ± 1.43	2.63	0.025

Table 2: Mean & SD of Difference between Pre and Post Values of MMT by ANOVA

VARIABLES	MEAN ± SD	"F" VALUE	"p" VALUE
Upper trapezius & levator scapulae	0.181 ± 0.60	12.055	<0.0001
Middle trapezius	2.09 ±1.30		
Lower trapezius	1.81 ±1.60		
Rhomboids	2.54 ± 1.21		
Serratus anterior	4.18 ± 1.60		
Pectoralis. Minor	3.81 ± 1.16		
Pectoralis Major(U.F)	3.54 ± 1.36		
Petoralis.Major(L.F)	4.27 ± 1.34		
Latissimus dorsi	3.90 ±1.37		
Middle Deltoid & Supraspinatus	2.81 ± 0.87		
Anterior deltoid	2.36 ± 1.36		
Posterior deltoid	1.45 ± 1.12		
Teres major & subscapularis	1.54 ± 1.21		
TeresmInor& infraspinatus	1.90 ± 1.44		
Coracobrachialis	1.09 ± 1.37		

Fig 1: Comparison of MMT Pre & Post MRM by Paired "t" test

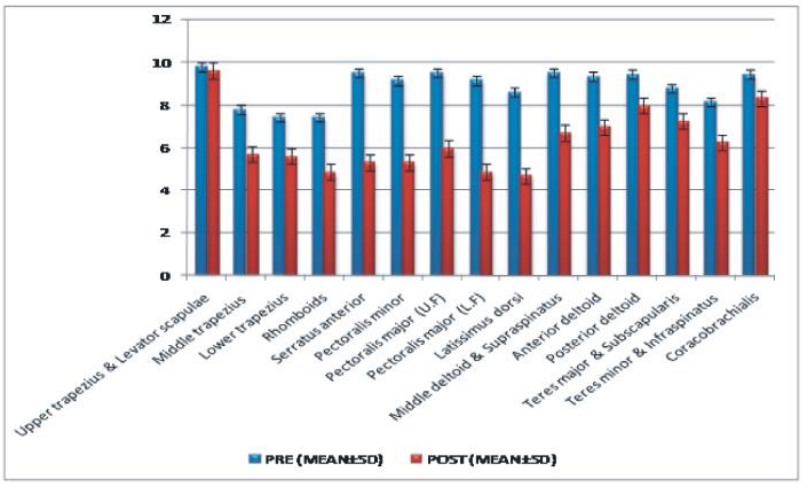


Fig 2: Mean & SD of Difference between Pre & Post Values of MMT by "ANOVA"

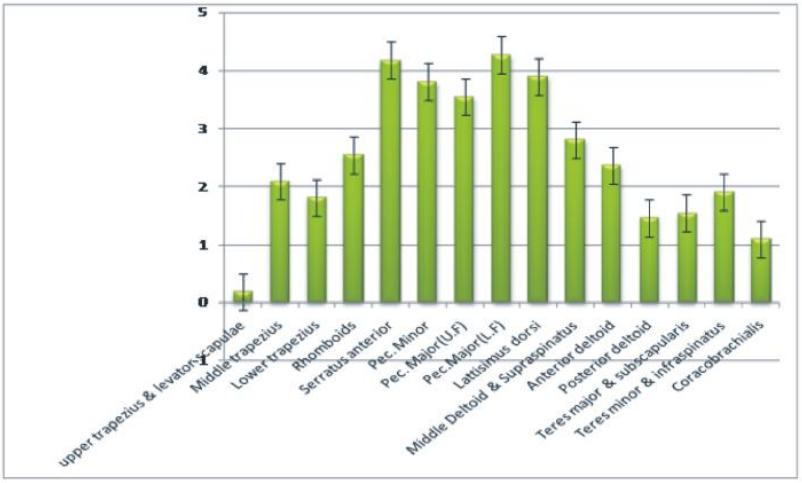


Table 3: Comparison of ROM Pre & Post MRM by Paired "t" test

VARIABLES	PRE (MEAN ± SD)	POST (MEAN± SD)	t- VALUE	p- VALUE
Flexion	176 ± 8.20	116.22± 19.44	11.625	<0.05
Extension	49.75 ±5.24	42.38 ± 6.7	5.255	
Abduction	170.50 ±24.58	103.15 ± 20.45	7.539	
Horizontal adduction	84.50 ± 13.11	70.60 ± 11.65	7.417	
Medial rotation	63.96 ± 5.43	58.30± 6.68	3.497	
Lateral rotation	83.20 ± 9.36	72.24 ± 12.84	4.576	

Table 4: MEAN & SD of Difference between Pre & Post Values of ROM by "ANOVA"

VARIABLES	M ± SD	F VALUE	p VALUE
Flexion	59.77 ± 1.70	39.72	< 0.0001
Extension	7.37 ± 4.65		
Abduction	67.35± 29.63		
Horizontal adduction	13.90 ± 6.21		
Medial rotation	5.60 ± 5.32		
External rotation	10.95 ± 7.93		

Table 5: Inter Variable Comparison of ROM by Post – hoc Tukey Comparison Test

COMPARISON	MEAN DIFF.	"q" VALUE	"p" VALUE
Flexion Vs Extension	52.4	11.5	<0.05
Flexion Vs Abduction	-7.58	1.66	>0.05
Flexion Vs Horizontal adduction	45.87	10.07	<0.05
Flexion Vs Medial rotation	54.16	11.89	<0.05
Flexion Vs Lateral rotation	48.81	10.72	<0.05
Extension Vs Abduction	-59.982	13.17	<0.05
Extension Vs Horizontal adduction	-6.527	1.43	>0.05
Extension Vs Medial rotation	1.764	0.38	>0.05
Extension Vs Lateral rotation	-3.58	0.78	>0.05
Abduction Vs Horizontal adduction	53.45	11.73	<0.05
Abduction Vs Medial rotation	61.74	13.55	<0.05
Abduction Vs Lateral rotation	56.4	12.38	<0.05
Horizontal adduction Vs Medial rotation	8.29	1.82	>0.05
Horizontal adduction Vs Lateral rotation	2.94	0.64	>0.05
Medial rotation Vs Lateral rotation	-5.34	1.17	>0.05

Fig 3: Comparison of ROM Pre & Post MRM by Paired "t" Test

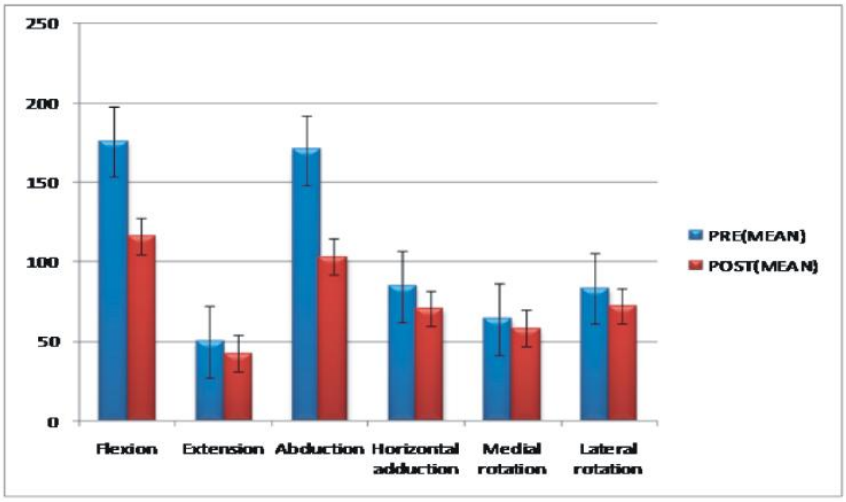
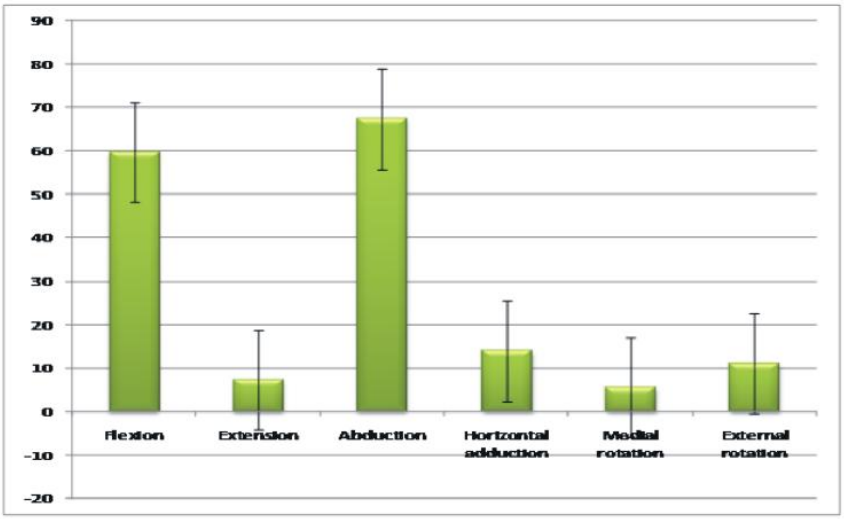


Fig 4: Mean & SD of Difference between Pre & Post Values of ROM by "ANOVA



ROM & MMT, a 2 way repeated measures analysis of variance (ANOVA) was performed followed by post hoc for multiple comparison between variables.

Results

Overall analysis of various scores showed that ROM & MMT values of shoulder complex decreased significantly after MRM.

Discussion

Breast cancer is the most frequent neoplasm among women; it is traditionally treated by surgery ranging from quadrantectomy to widened modified radical mastectomy, of which common sequels are changes in articular range of motion, muscle strength decrease, lymphedema, and adherences. Shoulder movement power & strength impairment is a commonly reported consequence of surgery for breast cancer. This impairment of shoulder complex can be attributed to many factors.[9]

According to A.C Voogd *et al* cancer patients are vulnerable to overall decrease in activity which is also referred as inactivity disuse syndrome or immobility syndrome. Earliest & most frequent result of immobility/ inactivity usually occurs in musculoskeletal system and also muscle at rest lose strength rapidly which leads to generalized weakness. Fatigue also affects 70% of cancer patients during chemo & radiotherapy or after surgery & in response to fatigue patients down regulate their level of daily activities.[10]

Activity avoidance advice post surgery may be disservice, as upper extremity strength may worsen over time with decreased use. C.R. Merchant stated that intent to protect the limb from maximal exertion can also have an impact on muscular effort.[11]

Most significant reduction in strength were found in pec. major & minor, latissimus dorsi, serratus anterior & rhomboids. Explanation for reduced strength of pectorals & latissimus dorsi can be provided on the basis of surgical technique of "MRM" as it involves incision of lower lateral fibers of pec major & detachment of origin of pec minor which enables sufficient retraction of these muscles to provide excellent axillary exposure.MRM also involves a transverse or slight oblique incision that extends to a point slightly beyond edge of latissimus dorsi muscle & hence may be a factor in reducing its strength.[3,12]

Scapular retraction stretches the muscle & tissue across the anterior chest wall which may initiate stretch pain around the surgical site & leads to decrease in strength of rhomboids. Reduction in strength of serratus anterior muscle can be due to transient traction injury to long thoracic nerve during the surgery. Insignificant reduction in strength of upper trapezius muscle can be explained on the basis of study done by Barbara A Springer *et al* which states that breast cancer survivors exhibit greater EMG activation of upper trapezius than did healthy subjects during upper limb low load functional tasks.[5,13]

The reduction in "ROM" of shoulder complex after "MRM" can be supported by various studies. N.Ryttov *et al* stated that damage to pec.major fascia & protective axillary connective tissue may contribute to limited arm & shoulder movement. Following surgery with axillary lymph node dissection 73% of women reported restricted shoulder mobility, tightness, edema, pain, numbness of arm & limitations in daily life activities and these complaints could be due to tissue & nerve damage and also due to possible brachial plexus traction during the procedure.[14,15]

Other factors leading to impairment of ROM are surgical aggression, inactivity or immobilization of limb & protective posturing.[16,17] (Bankoff *et al* & Betty smoot *et al*). Another possible explanation for reduction in ROM can be that post mastectomy groups used adaptive strategies as drain is inserted in incision on chest wall to enable drainage of seroma & women are encouraged

not to elevate their arm above head in early post-op period & furthermore even after drain removal women are instructed to protect their affected limb to prevent lymphedema & this reduced frequency & amplitude of elevations of arm following surgery & during every day activities contributes to altered kinematics & adaptive changes to motor patterns.(Jack corsbie *et al*). Complex kinematic distortions, particularly during abduction in coronal plane, in which relationship between scapular & glenohumeral movements are changed, leads to highly significant reduction in range of shoulder complex abduction.[18,19,20]

Conclusion

The Present study concluded that the MRM can significantly reduce strength of various muscles as well as ROM of shoulder complex. Hence it appears that rehabilitation protocol after MRM should undergo careful construction so as to involve ROM exs & strength training of individual muscles, tailored according to patient's impairments. Therefore continued well being of breast cancer patients after surgery depends on need for an individualized & specific exercise intervention to help restore patients to fully functional state & in-turn improving over all quality of life of breast cancer survivors.

Clinical Implications

Upper extremity weakness & restricted shoulder mobility is a well known sequel, found in almost all the subjects after the treatment of breast cancer. General ROM & strengthening exercises were use to be followed after the surgical treatment, but not much of the importance was given to development of specific rehabilitation protocol for breast cancer survivors. The following study will help in formulating specific, systematic & individually tailored & controlled rehabilitation protocols for breast cancer patients which in turn will help in preventing disabilities & will also enhance working ability, overall wellbeing & functioning among breast cancer patients & improve their quality of life. It will also help in pre-op. training of muscles for early recovery of shoulder function in breast cancer survivors.

Future Research

1) Future research is necessary with a comparatively large sample size.
2) Influence of operated side (dominant or non-dominant) on ROM & strength of shoulder complex should be evaluated.
3) Specific & scientific rehabilitation protocol should be generated for patients undergoing MRM.

Conflict of Interest & Ethical Approval

There was no conflict of interest was reported among all authors. This research work is approved by ethical committee of HIPMS, HIHT University (UK) India,

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An Examination of Physiotherapy Practice Pattern in Cancer Rehabilitation: A Survey among Physiotherapists in South India

Karthikeyan G.*, Udaya Kumar Manoor, Sanjay S. Supe*****

Abstract

Physiotherapists contribute significantly to the maintenance of functional independence and quality of life among cancer patients through early intervention and community follow up. Very little has been documented about the extent Physiotherapists are involved in the care and management of individuals with functional deficits related to cancer in India although physiotherapists are mandatory to promote and maintain physical function. The purpose of this study was to examine and describe current practice patterns of Physiotherapists in cancer rehabilitation in South India.

A descriptive study was performed using the survey method for data collection among 1120 randomly selected Physiotherapists licensed and practicing in South India. Following institutional review board approval, surveys with consent forms were e-mailed to subjects and subjects received follow-up e-mail reminders.

Usable surveys returned were 188 (18.13%). 62.8% of therapists reported treating individuals with a history of cancer while only 17.8% were treating the cancer patients on regular basis. Most common patients were with breast cancer (75%); common treatments were: home exercise programs and breathing exercises (both 77.1%), range of motion exercises (68.6%), chest clearance techniques (64.6%), strengthening and education (both 60.4%), and stretching (56.3%), Monitoring methods were: heart rates (58.3%), blood pressure (54.2%), pain scale and O_2 saturation levels (47.9%), and rates of perceived exertion (37.5%), functional outcome measures were: 6 minute walk test (41.7%), quality of life (20.8%), SF-36 (18.8%), and Functional Independence Measure (14.6%).

We found that, only very few physiotherapists are practicing exclusively in cancer care setting in South India. Intervention types were satisfying while monitoring and functional outcome measures were inconsistently used. Furthermore, number of physiotherapists working in the cancer centers is no match for the increasing demand of physiotherapy in cancer care.

Keywords: Physiotherapy, Rehabilitation, Cancer treatment, Survey, Practice patterns.

Introduction

Cancer has become a common condition and a source of significant disability. There is an increasing number of individuals living with long-term and short term side effects of cancer and anti-cancer treatments who require supportive care. Individuals undergoing cancer treatment or in survivorship often develop functional deficits from pain, movement restrictions, fatigue, lymphedema, skin and soft tissue breakdown, and difficulty breathing.[1-4] Thus cancer may result in multiple impairments and disabilities that limit physical performance and activities of daily living.[5] This functional loss can be devastating to the patients, and results in a significant social and economic burden to their families and to society with increased levels of disability among cancer patients and survivors.[6,7] Current perspectives on cancer rehabilitation see it as a field concerned with

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helping each patient in many broad areas of human function including physical, psychological, social and vocational activities.

Cancer rehabilitation takes place in various stages in different forms, such as Preventive, Restorative, Supportive and Palliative rehabilitation therapy.[8] Physical exercise is perhaps the most important therapeutic modality in the rehabilitation management of physical disabilities.[9] Exercise could play a potential role as complementary therapy for cancer patients during and after treatment.[10] Supervised exercise programs during and after treatment show positive benefits on strength, cancer-related fatigue, physical functioning, and quality of life.[11-14] There are no formal cancer rehabilitation programs even in some of the developed countries, and there is a shortage of cancer rehabilitation programs around the world.[15,16] But, there is an underuse of rehabilitation services for cancer patients across the world. In some country rehabilitation services for cancer patients are also limited. The reasons of this fact include the following suggestions; failure to identify functional impairments by the acute care staff, lack of appropriate rehabilitation referrals, lack of awareness of rehabilitation services, and lack of knowledge about such services among family members.[17]

Physiotherapy helps cancer survivors to improve their physical skills, mobilize in a different way, or use assistive equipment. In cancer care, formalized physiotherapy involvement dates back to the 1960s, before the commencement of the modern hospice movement.[18] Today, the involvement of physiotherapists in the field of oncology is diverse and includes specific roles which are evidence based and commonly applicable. In addition, Physiotherapists guide patients how to safely exercise either to improve circulation, reduce swelling, and keep the muscles healthy to prevent deformities and health complications.[19]

Postoperative physiotherapy includes prevention and management of various system complications.[20] They prescribe specific therapeutic exercise programs like supervised resistive strengthening/aerobic exercise to improve strength, tolerance and fatigue after cancer surgery/radiotherapy.[21] It is proved that lymphedema can be prevented or reduced if patients receive physiotherapy soon after their operation.[22] Apart from that, involvement of physiotherapists include acute institutional and community based rehabilitation through simple measures and also palliative care by utilizing all of the above applications to optimize quality of life and contribute positively to easing care giver's burden.[23] In addition, in hospice and palliative care settings physiotherapy treatments help to promote and maintain function.[24,25] In this regard, Physiotherapy, can contribute significantly to the maintenance of functional independence and quality of life among patients receiving palliative care.[23]

However, very little has been documented about the extent Physiotherapists involved in the care and management of individuals with functional deficits related to cancer.[9,26,27] In India, the situation is still worse with some of the regional cancer centers are not having the physiotherapy facility itself. Kathie, *et al*, (2004) found that only 46.8% physiotherapists were treating individuals with diagnosis of cancer in Washington.[28] Among them, 40% of respondents did not measure functional outcomes and 10 % of respondents did not monitor these individuals during treatment. Besides, physiotherapists used primarily strengthening, range of motion, patient education, and home exercise programs while functional outcome assessments, an indication of the progress and merit of interventions were inconsistently performed.[29] Furthermore, although large numbers of individuals have experienced cancer, very few of these individuals have benefited from the care of Physiotherapists. Even, cancers survivors are poorly integrated back into the workforce due to lack of health care provider and employer knowledge on return-to-work practices.[30] Although studies describe the degree that cancer and its treatments contribution, at the present time the number and type of cancer

survivors that would benefit from Physiotherapy interventions are unclear. In India no studies are found in this respect.

As the expanded information on Physiotherapist oncology practice patterns from the Indian states would be of benefit for advancing research initiatives, developing educational directives, and promoting professional practice guidelines in oncology physiotherapy practice, the aim of this study was to examine and describe current practice patterns of Physiotherapists in cancer rehabilitation in South India.

Methodology

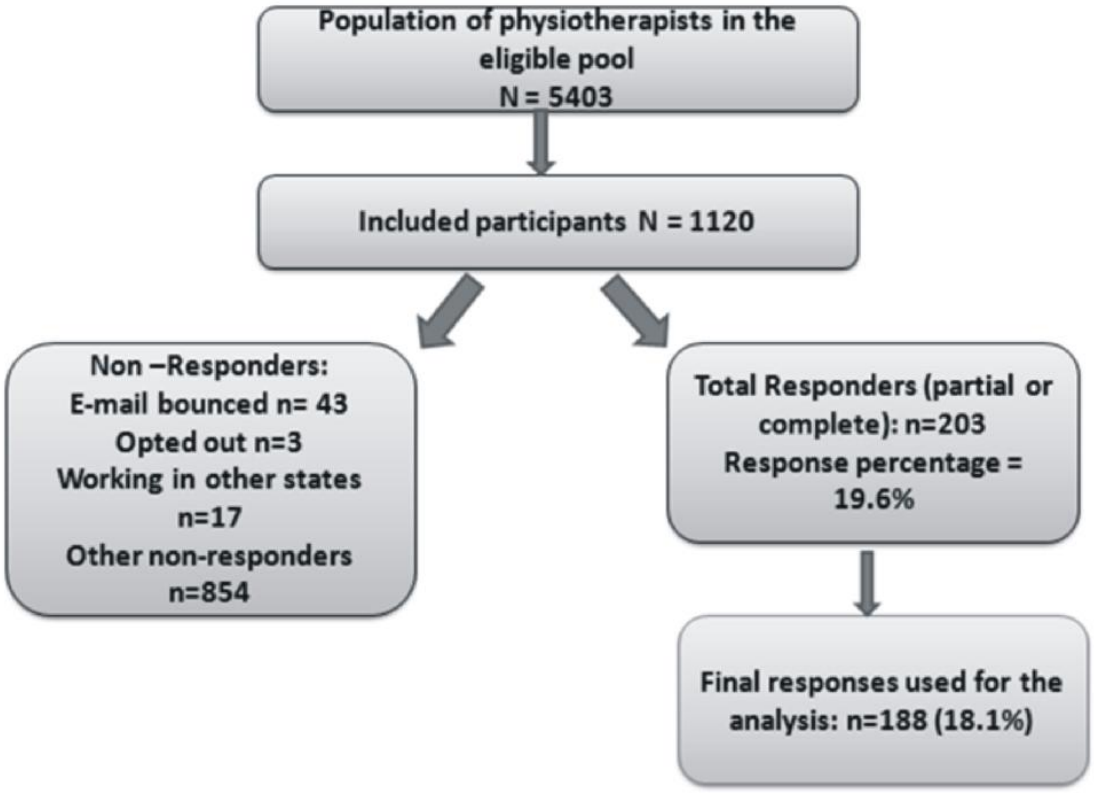
Since Indian physiotherapists' trend and practice pattern in cancer rehabilitation may be diverse and insufficient, this explorative research design was required to gain an insight into the current physiotherapy practice pattern. So, we opted for a survey using a valid, custom designed questionnaire. In this study, an estimated minimum of 355 responses were needed to detect significance with an alpha value set at 0.05.[31] Using a response rate of 31.7% (as of the previous study) and allowing for lost or undelivered surveys, we could able to identify the required sample size needed to achieve the minimum number of completed surveys.[29] Total 1120 Physiotherapists, qualified and currently practicing in the States of Tamil Nadu, Karnataka and Kerala of Southern part of India were included. Subjects were randomly selected through a computer randomization from an eligible pool of 5403 individuals registered with Indian Association of Physiotherapists. Physiotherapists were not eligible to participate in this study if they were not currently practicing, retired, or practicing in other states or in other countries.

The original, self-administered, validated, English version of the Questionnaire to assess the Physiotherapy Practice Pattern in Cancer Rehabilitation was having questions regarding the professional qualification, experience, working set up, oncology case load, modalities prescribed for the cancer patients, diagnostic procedures used for the cancer patients and the physical and functional outcome measures used after the treatment of cancer patients under three sections.[32] The questionnaire was approved by the panel of experts and institutional ethical committee.

Procedure

Following receipt of institutional review board approval, surveys were sent by electronic mail to the sample subjects in these three states. The contact e-mail addresses have been identified from the data bases of Indian Association of Physiotherapists. The e-mailing included a cover letter stating the purpose of the study, an informed consent form, instructions on how to complete the survey, and the survey. The survey was made in writable pdf format using Acrobat-professional package (Adobe® Acrobat® X Pro) so that the respondents are just required to download the survey, type their responses and send back the same without the need to take print or to save. To assure confidentiality, the respondents name did not appear on the survey response form; however, respondents were instructed to sign an attached informed consent form. The e-mailing was done using a separate mail-id created for this purpose. To increase the response rate, an electronic survey was produced using 'Survey Monkey' online survey system (Copyright © 1999-2012 SurveyMonkey) on contract and the URL was been sent to the participants. This made the answering pattern as very easy and convenient. So the participants just needed to click that URL which took them to the survey page and then click on the responses as per the guidelines provided for each questions. Further to increase the response rate exactly after every week, another reminder mail was sent to every participant for three consecutive weeks. Third reminder was mentioned as final reminder. Survey was done between March and June 2012. To protect the anonymity of the participants, their names were not mentioned in the text in the results section. The name of the each respondent has been

Figure 1: Population, Non-responder and Responder Numbers, and Response Percentage



replaced by a number. Each number had been assigned to one particular survey participant.

Data obtained from the surveys were entered into and analyzed with SPSS (version 20.0, ©IBM Corporation, 2011). Descriptive statistics were used to assess responses on the survey. Spreadsheets were made for the multiple answer questions and Frequency distributions (number and percentage) were calculated for each question.

Result

The response rate to the mailing was 203 (19.6%) completed surveys. Following the recommended time interval, reminders mails were sent to non-responders to improve the response rate. The final response rate (Figure 1) was 188 (18.13%) as only 188 surveys were partially or fully completed and used in the study. Surveys that were returned but not used in the study included 15 which were incomplete. Furthermore, 43 surveys among the total sent were undeliverable due to incorrect e-mail addresses, 3 therapists opted not to participate in the survey and 17 response surveys were belonging to the Physiotherapists currently working in other states although they were basically belong to any of these three states. So those 17 surveys also were not considered as response and were not included for the data evaluation.

Respondent Demographics

Table 1 shows the demographic characteristics of the respondents. 130 respondents were male and 58 were female. All the respondents were currently in the job. Out of total 188 respondents, 77 Physiotherapists (41%) were from Tamil Nadu while 67 (35.6%) from Karnataka and the remaining 44 (23.4%) were from Kerala. The mean age of the respondents was 30.51±4.3 years. Among them 63.8% were working as Physiotherapist while the remaining 36.2% were working as academicians in the colleges. Entry level Physiotherapy degrees of respondents were 27.7% Bachelor in

Table 1: Demographic Characteristics of the Respondents

Characteristics		N	%
Gender	Male	130	69.1
	Female	58	30.9
Designation	Therapist	120	63.8
	Academician	68	36.2
Current area of practice	Acute Ortho	35	18.6
	Out-patient Ortho	94	50.0
	Acute Neuro	1	0.5
	Out-patient Neuro	17	9.0
	IP rehabilitation center	20	10.6
	Extended care Facility	3	1.6
	Academic institution	17	9.0
	Other	4	2.1
Highest entry-level degree	BPT	52	27.7
	MPT	130	69.1
	PhD	6	3.2
Speciality	Cardio-Respiratory	26	13.8
	Musculoskeletal	84	44.7
	Neurology	33	17.6
	Paediatrics	16	8.5
	CBR	6	3.2
	Others	8	4.3
Experience	Less than 2years	37	19.7
	2-5 years	46	24.5
	More than 5 years	105	55.9
Attended Oncology related workshops/ continuing education		49	26.1

Graph 1: Practice Settings Reported by Number for All Respondents

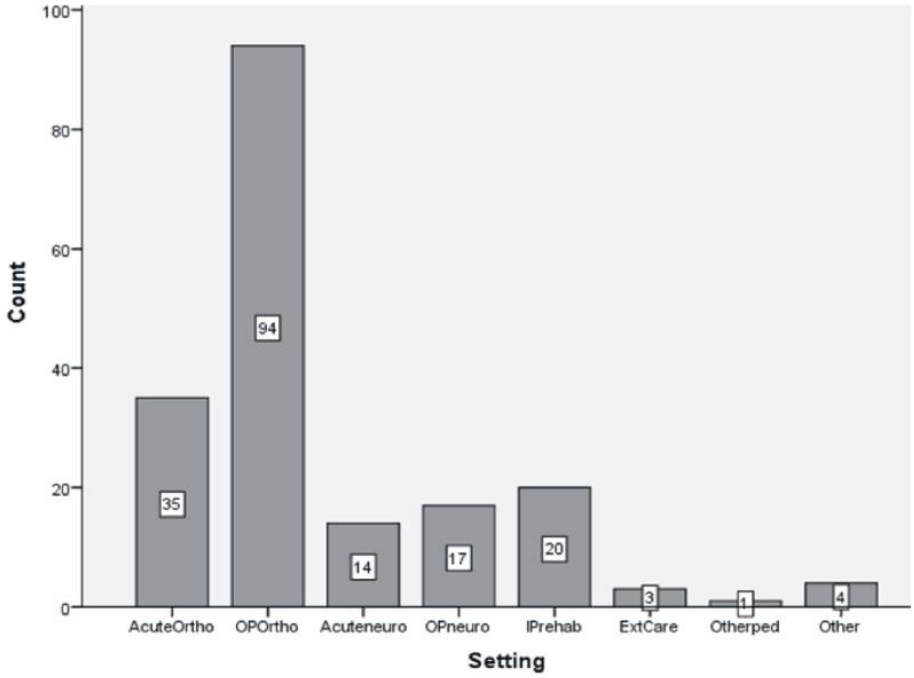


Table 2: Cancer Patient Load for the Respondents

Characteristics		N	%
Treated cancer patients		118	62.8
Cancer Practice Routine	Regularly	21	17.8
	Occasionally	57	48.3
	Rarely	40	33.9
No. of cancer patients treated till now	Less than 2	10	8.6
	2-5	34	29.3
	6-10	26	22.0
	More than 10	48	40.7
Mode of approaching the cancer patients	In-patient	13	27.1
	Out-patient	11	22.9
	Both	24	50.0
Mode of cancer patients referred for physiotherapy	Direct	8	16.7
	Physician/surgeon	40	83.3

Physiotherapy; 69.1% Master of Physiotherapy; and 3.2% were Doctor of Physiotherapy. The specializations of respondents were; Musculoskeletal was the most common (44.7%), followed by Neurological (17.6%), Cardio-Respiratory (13.8%), Paediatric (8.5%), CBR (3.2%) and the others (4.3 %) including OBG. The 'Musculoskeletal' category included specialization in Hand Rehabilitation, Manual Therapy, and Sports Physiotherapy. The working experience of the respondents after their graduation was; 19.7% with less than 2 years and 24.5% with 2-5 years while 55.9% were with more than 5 years of experience. The current practice settings (Graph 1) of respondents were; out-patient orthopaedics was the most common (50.0%), followed by Acute Orthopaedics (18.6%), In-patient rehabilitation centre (10.6%), Out-patient neurology (9.0%), Academic Institute (9.0%), other (2.1%), extended care facility (1.6%), and the acute neuro care (0.5%). The 'other' category represented write-in responses that

Graph 2: Reported Oncology Patient Caseload Percentage

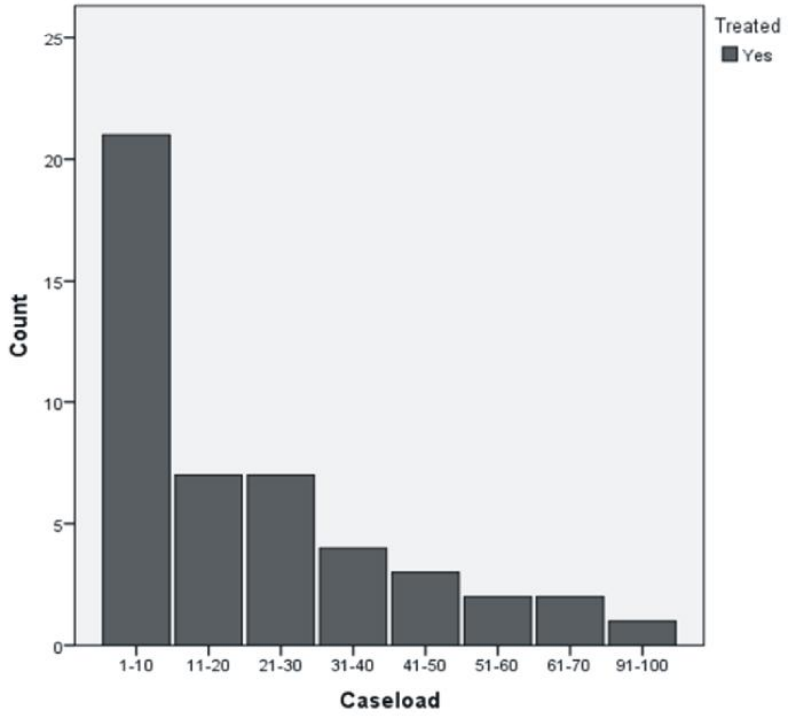
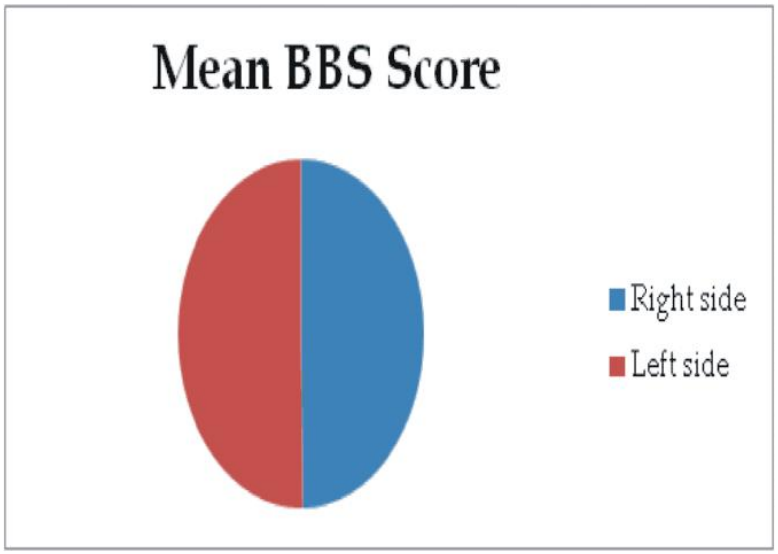


Table 3: Descriptive Statistics for the Frequency and Type of Cancer Patients had been Treated by the Respondents

Sl. No	Type of cancer	Treated	Frequency	
			Less	More
1	Breast	36 (75)	20(55.6)	16(44.4)
2	Skeletal	29(60.4)	18(62.1)	11(37.9)
3	HNC	30(62.5)	18(60.0)	12(40.0)
4	Nervous System	28(58.3)	19(67.9)	9(32.1)
5	Lung	30(62.5)	23(76.7)	7(23.3)
6	GIT	24(50.0)	19(79.2)	5(20.8)
7	Lymphoma	18(37.5)	13(72.2)	5(27.8)

Read the values as: Frequency (percentage)

Graph 3: Most Commonly Reported Interventions



were primarily home care, but also included fitness centre, and cancer centre.

A total of 118 physiotherapists (62.8%) reported treating individuals with an oncology history. (Table 2) Among them, 48.7% of the respondents in the out-patient orthopedics, 20% in Acute Orthopedics, 11.3% in In-patient rehabilitation centre, 7.8% in Out-patient neurology, 7% in acute neurology, 2.6% in extended care facility and 1.6% in other categories reported working with individuals with an oncology diagnosis or history. Furthermore, only 17.8% of those having the cancer patient case load were treating the cancer patients regularly while 48.3% were dealing occasionally and about 33.9% were dealing with cancer patients rarely. In addition, only 40.7% of them answered that they had treated more than 10 patients till now while the remaining physiotherapists had treated less than 10 cancer patients.

The most common response for caseload percents (Table 2) was that respondents did not treat individuals with oncology conditions (37.2%). Among the respondents treated cancer patients, the common case load (Graph-2) in a typical week was "1-10 %" (44.7%) of the caseload category followed by "11-20" and "21-30 %" (14.9%). This indicates that 58.5% of respondents never or rarely manage individuals with oncology diagnoses or histories. Among the respondents who had dealt with cancer patients (48), most number of therapists had treated the patients with breast cancer (75%) followed by HNC & Lung (62.5%), Skeletal (60.4%), Nervous system (58.3%), GIT (50.0%) and the least amount (37.5%) of Lymphoma patients. The frequency

of cancer patients the therapists encountered for each type is provided in Table 3. It shows that most of the respondents (more than 55.5%) had treated various types of cancer patients less frequently. For a surprise only 4 out of the total 188 respondents were working in the oncology rehabilitation centres.

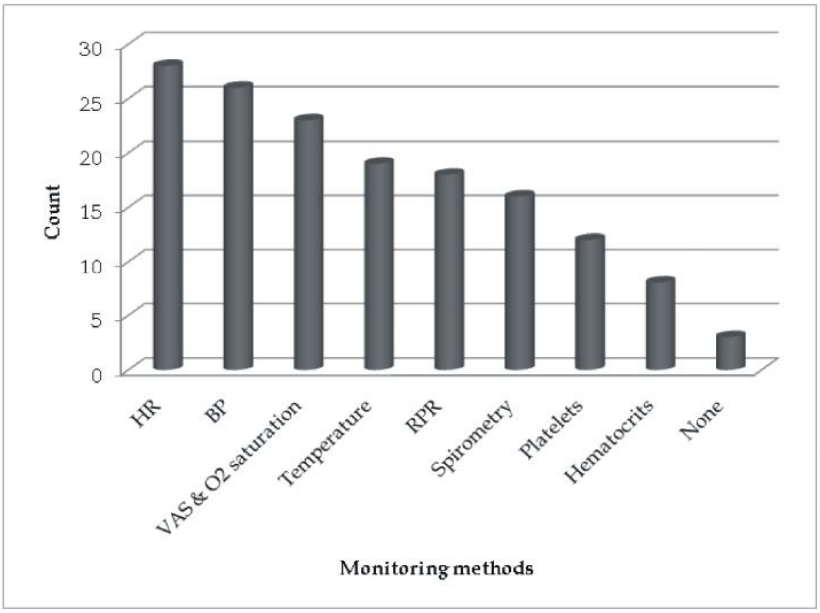
Interventions

Most (34) of the respondents have mentioned that Pain was the most common symptom for which the cancer patients were referred or contacted for physiotherapy treatment followed by other symptoms in the following order; General weakness (29), Joint stiffness (28), Breathing difficulty (24), Neurological symptoms (22), Muscle tightness/Scar & Swelling (21), and lastly (4) for the skin/vascular problems. Though the therapists were working in different set ups, most of them (83.3%) received the cancer patients by both directly and physician/ surgeon referral while only 26.4% were receiving the patients directly. Likewise, 50.0% of the respondents approached the cancer patients both as in-patients and out-patients while 27.1% of the respondents approached only as inpatient and the remaining (22.9%) approached the cancer patients as out-patient only.

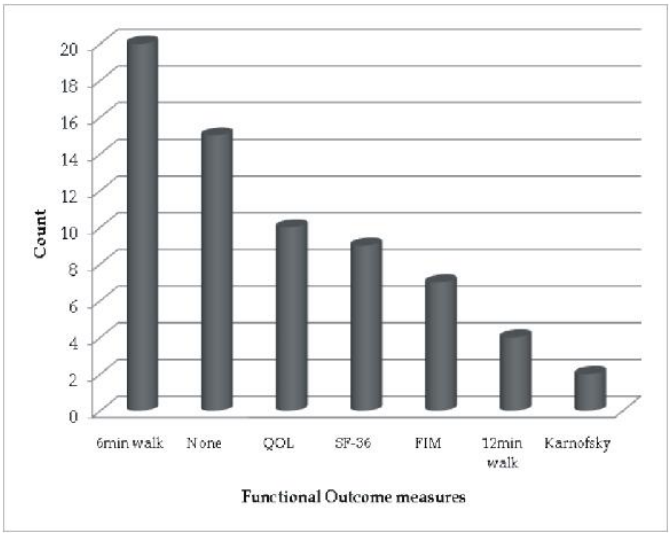
Interventions reported by respondents are displayed in Graph 3. The most common interventions used were home exercise programs (HEP) and breathing exercises (both at 77.1%), range of motion (ROM) exercises (68.6%), chest clearance techniques (64.6%), strengthening exercises and patient education (both at 60.4%), stretching (56.3%), manual lymphatic drainage (MLD) (54.2%), scar mobilization (43.8%), aerobic exercises (39.6%), Energy conservation techniques (ECT) (37.5%), and compression bandaging (35.4%). The least commonly used treatments were compression garments (25.0%) and warm-up (16.7%), cool-down (14.6%) and compression pumps (12.5%). In addition to these interventions, many therapists were using gait training, prosthetic training balance training as a part of cancer rehabilitation.

The most commonly used interventions for the lung cancer patients were breathing techniques (100%), chest clearance techniques (90%) and HEPs (60%), while ECTs (43.3%), aerobic exercises (36.7%) and patient education (33.3%) were moderately used. Likewise for the skeletal cancer patients (60%), HEPs (89.7%), stretching (72.4%), ROM

Graph 4: Most Commonly Reported Monitoring Methods



Graph 5: Most Commonly Reported Functional Outcomes Measures



techniques (69%), and strengthening (55.2%) were commonly used and scar mobilization (37.9%) was used less commonly. For the leukaemia sufferers, energy conservation techniques and home exercise programs (both at 43.3%), Breathing techniques and patient education (both at 33.3%) were only used that too in a moderate rate. For nervous system cancers, mostly strengthening (78.6%), HEPs (64.3%), patient education (61.1%) and moderately stretching (46.4%) were used in the rehabilitation. For the breast cancer rehabilitation, mostly MLD (77.8%), HEPs (72.2%), compression bandaging and stretching (both at 63.9%), patient education (61.1%) were used while scar mobilization (52.8%), compression garments (41.7%), strengthening (38.9%), ROM techniques (36.1%), breathing techniques (33.3%), chest clearance techniques (25%). For lymphoma sufferers, patient education (83.3%), MLD and compression bandaging (72.2%), HEPs (66.7%), ECT (50.0%) were mostly used. For gastro-intestinal tract (GIT) cancers, most commonly HEPs (62.5%) and less commonly breathing techniques (33.3%) were used. Finally for the HNC rehabilitation, mostly stretching (60%), ROM techniques (52.1%), and patient education (55.8%) were used.

The most commonly used modality for the cancer pain relief was TENS (77.1%), followed by cryotherapy (37.5%), moist heat pack and Interferential Therapy (both at 27.1%), while UST (14.6%), and hydrotherapy (6.3%) were least commonly used. In addition to these modalities, mirror box therapy also was used as pain relieving modality by few of the respondents. The most commonly used modality for the improvement of ROM as a treatment of hypo-mobility after the cancer treatment were assisted exercises (70.2%), followed by active exercises (66.7%), and passive mobility exercises (43.8%). In addition to these modalities, hold-relax technique and mobilization techniques also were used as modality for the improvement of ROM by few of the respondents.

The most commonly used modality for the lymphedema management among the cancer patients were limb elevation and compression bandaging (both at 64.6%), followed by ROM exercises (56.3%), MLD technique (47.9%), while pneumatic compression pump (33.3%), and faradic stimulation (25.0%) were least commonly used. One of respondent reported that none of these modalities were used for the lymphedema management. The most commonly used modality for the fatigue management among the cancer patients was ECT (56.3%), followed by relaxation techniques (52.1%), and stress management (27.1%), while exercises (20.8%), referral to nutritionist (16.7%) and advising rest (14.6%) were least commonly used. However, 7

Table 4: Therapists' Response towards the Practice Pattern/Approach

Sl. No	Practice pattern	Always	Often	Sometimes	Never
1	I follow patient and family centred approach during rehabilitation	22 (53.7)	15 (36.6)	4 (9.8)	-
2	Goal of rehabilitation is set in accordance with the expected prognosis of medical problem	18 (43.9)	18 (43.9)	4 (9.8)	1 (2.4)
3	Patient and care giver education is encouraged	25 (61.0)	11 (26.8)	4 (9.8)	1 (2.4)
4	Interdisciplinary approach is encouraged during rehabilitation	18 (43.9)	17 (41.5)	6 (14.6)	-
5	Reassessment and follow up care is done	20 (48.8)	16 (39.0)	3 (7.3)	2 (4.9)
6	Imparting physiotherapy care to patient suffering from oncological pathologies improve confidence and satisfaction in my profession	21 (51.2)	12 (29.3)	7 (17.1)	1 (2.4)

Read the values as: Frequency (percentage)

respondents (14.6%) reported that none of these modalities were used for the cancer related fatigue management. Regarding the decision making on choosing the treatment modality out of 41 respondents who answered, 68.3% of the respondents had used to discuss with the physician/surgeon regarding the evaluation and treatment and 31.7% of the respondents had used to take their own decision based on their evaluation.

Monitoring Methods

Monitoring methods used during treatment of individuals with oncology diagnoses or histories are presented in Graph 4. Out of 48 therapists 45 had used (93.7%) either of the monitoring parameters while 3 report not monitoring vital signs or laboratory values in indi-viduals with oncology diagnoses or histories during treatment. The monitoring methods commonly used in South India included heart rates (58.3%), blood pressure (54.2%), VAS for pain and oxygen saturation levels (47.9%), temperature (39.6%), rates of perceived exertion (37.5%), spirometry (33.3%), Blood sugar (29.2%), platelets (25%), Oxygen consumption (VO2) and White blood cell (both at 20.8%), Hematocrit and electrolytes (both at 16.7%) and dynamometer (10.4%). In addition, few of them reported that they had used haemoglobin count also as a monitoring method.

Functional outcomes measures are pictured in Graph 5. Among all respondents, 15 (31.3%) therapists reported that functional outcomes measures were not performed in individuals with oncology diagnoses or histories. Among those respondents that performed functional outcomes assessments, the most commonly reported were the 6 minute walk test (41.7%) followed by quality of life (QOL) measurement (20.8%), SF-36 questionnaire (18.8%), Functional Independence Measure (FIM) (14.6%), 12 minute walk test (8.3%) and karnofsky index (4.2%).

Professional Approach and Satisfaction

To assess the professional approach and the satisfaction towards the patient care six items were used based on likert scale scoring system. 41 responses were been registered. The results are shown in Table 4. Caregiver education (61.0%), family centred approach (53.7%) and improved satisfactions (51.2%) were most commonly rated by the respondents as always in their practice in cancer patient rehabilitation. At the same time the goal of rehabilitation, interdisciplinary approach and reassessment were followed moderately by the respondents. Only few respondents reported that they had never followed such things in their practice.

Discussion

Cancer rehabilitation in India has received relatively little research and educational efforts as compared to other areas of practice. While not all cancer survivors will be in need of rehabilitation services, a large survey of cancer survivors of developed countries indicated that the long-term health consequences of cancer are significant in the cancer rehabilitation.[6] The Physiotherapist has an extensive role to play in palliative oncology, beginning early with rehabilitation and continuing as a team member into hospice care.[33,34] As there is growing interest in recovery of physical function, health maintenance, and health promotion among the cancer survivors it was mandatory that looking into the current practice pattern of physiotherapists in cancer care. So that better plan of care can be integrated into the multidisciplinary care for the cancer survivors. Response rate in this study (18.1%) is almost similar to a previous study where they also got only 23.5% response in their survey.[29] The exact reason for the poor response rate was unclear. We have used the electronic sources for the survey and the previous study had used postal mail with reply envelop. As all the therapists are practicing either they wouldn't have got the time to fill the survey or some may be hesitant to participate in these both studies.

In this study it was found that, 58.5% of respondents never or rarely manage individuals with oncology diagnoses or histories in South India while in Michigan State the percentage was 77% even though it was a developed country.[29]Likewise, the most common response (44.7%) for caseload of 1-10% in these states indicates that only few cancer patients have benefited from the care of Physiotherapists. Likewise in previous studies also caseload percentage was of 1-10% in Michigan and 0-25% in Washington State.[28,29] So, to prevent the answering based on the knowledge rather than based on experience of treating the cancer patients, physiotherapists who have treated at least more than 10 cancer patients till now only were allowed to fill the questions regarding the treatment for the cancer sequel.

With the mean age 30.5 ± 4.30 years and mostly (55.9%) having experience more than 5 years after their graduation, 50% of the respondents were working in the out–patient orthopaedic setting and for a surprise only 3 therapists were working in the exclusive cancer centre. This would have been a reason for the lesser number of therapists' response as treated cancer patients. This is the situation in South India where many of the major cancer centres are running without physiotherapy departments which has given a lesser chance for the more number of physiotherapists to serve in the cancer rehabilitation. The perplexing reason why these cancer centres are not having the physiotherapists irrespective of their huge cancer patient load is unclear. Pain, general weakness, joint stiffness, and Breathing difficulty were the common symptoms for which cancer patients who either approached or been referred to them. Greater numbers of physiotherapists in South Indian states used primarily HEPs, breathing exercises, ROM exercises, chest clearance techniques, strengthening exercises and patient education. At the same time ECT, compression bandaging, compression garments and compression pumps were least commonly used.

Individuals who undergo chemotherapy or radiation treatments are at risk for developing cardiovascular and pulmonary toxicities and therefore, require vital signs and laboratory findings monitoring to assure safety during Physiotherapy interventions.[35]Observations from this study reports that cancer patients were adequately monitored during treatments. Only 6.3% of respondents did not use any of the monitoring parameters like in a previous study where 12.8% of physiotherapists did not monitor vital signs or laboratory values. (Drouin, *et al*., 2008) Moreover, of 93.7% respondents that monitored, less than 58.3% only monitored either vital signs or laboratory values where in Michigan study also less than 53% of the

respondents only monitored.

In addition, functional outcome assessments which are used to find the progress and efficacy of Physiotherapy interventions were inconsistently performed by the therapists in South India. In this view, 31.3% of the respondents in this study had never used any outcome measure to find out the progress in their patients. Even in Michigan study most of the therapists (27%) had not used the outcome measures while six minute walk test was the only test most commonly was used (8.0%) compared to our study (41.7%). Meanwhile, FIMs, twelve minute walk test and the Karnofsky scales were least commonly used by the therapists in this study. Likewise the symptom specific management for the cancer survivors was satisfying where the pain, hypo mobility, fatigue and lymphedema were efficiently been managed by the therapists. In this regard, another group of researchers also found that 78% of therapists recommend and/or use exercise as part of the management of fatigue; 74% teach most commonly ECTs (79%).[36]

In this study we tried to find the professional approach followed by the therapists towards the cancer rehabilitation and found that almost all are following satisfying practice in oncology care. Furthermore, only few of them have not set the goal of rehabilitation in accordance with prognosis and have not followed patient and caregiver education. Likewise, only few haven't followed up the patient and haven't got the satisfaction in cancer rehabilitation. This study had some limitations in terms of low response rate (18.1%) which reduced the confidence levels, and made us too could not determine practice patterns of non-responders. Furthermore, generalizations from this study to other geographic locations are restricted as it is done only in South India.

Conclusion

It is concluded that, although individuals with oncology related functional deficits appear to benefit from Physiotherapy interventions, only very few physiotherapists are practicing exclusively in cancer care setting, particularly in extended care or hospice settings. The commonly used treatment modalities in cancer rehabilitation approach by the physiotherapists practicing in South India were satisfying. However, monitoring physical and physiological parameters of the cancer patients during treatment and measuring functional outcomes are inconsistently performed. Furthermore, it is found that number of physiotherapists working in the cancer centres is not satisfying while considering the increasing demand of physiotherapy need for them.

Further study is warranted to determine the number of cancer patients and survivors who experience functional deficits as a result of cancer and its treatments, to assess the referral patterns for Physiotherapy interventions in oncology related conditions, and to examine the proportion of cancer patients received Physiotherapy treatment as a part of cancer rehabilitation.

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Original Article

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Effect of Inhibitive Distraction on Cervical Flexion in Asymptomatic Subjects

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Abstract

Aim and objective: The purpose of this study was to determine the immediate effects of manual therapy technique called inhibitive distraction (ID) on active range of motion (AROM) for cervical flexion in asymptomatic subjects. **Methodology:** 50 subjects (mean age 24.12 year) with decreased cervical flexion ROM (less than 50^0) were randomly assigned to an experimental and a control group of 25 subjects each. We used the universal goniometer to measure pre and post intervention cervical flexion AROM in the sagittal plane within a single treatment session. Group A underwent ID and group B received placebo protocol. **Result:** Though both the groups improved significantly, group A-ID group result shows more significant in cervical flexion ROM improvement when compared with group B, the control group. **Conclusion:** Results concluded that ID can be effectively used to enhance the cervical flexion ROM even in asymptomatic subjects.

Keywords: Inhibitive distraction; Cervical flexion; Forward head posture; Neck dysfunction.

Introduction

Physical therapists place a diagnostic emphasis on identifying impairments that may be amenable to management with interventions within their scope of practice. Inhibitive occipital distraction technique is a combination of direct fascial technique and manual traction. It involves the use of digital compression for occipital extensors, in which occiput is distracted away from C1 by pulling it in a cephalward direction toward the therapist in second phase. This technique has been described within various manual medicine disciplines under various names such as cranial base release, sub-occipital release, and trigger point pressure release.[1,2]

Dvorák *et al* attributed cervical hypomobility to either a voluntary or reflexogenic muscular restraint caused by pain or a purely mechanical restraint caused by degeneration of the joint surfaces and ligaments. Corresponding to said degenerative process, Cantu and Grodin described a fibrotic process in connective tissue, whereby it shrinks progressively, caused by arthrokinematic dysfunction, poor posture, overuse, habit patterns, or structural or movement imbalances. They further suggested that in many cases the surrounding musculature maintains a hypertonic recruitment pattern long after the inducing injury has healed, potentially immobilizing joints by the surrounding muscle hypertonicity.[3,4]

Various postural changes have been seen in individual in second decade of life, which involves forward head posture, musculoskeletal disorders like trigger points. Estimated data shows that 80-90% of the population suffered from forward head posture.It has been postulated that myofascial trigger points exist as band of high sensitivity in abnormally tense muscles. These do not cause motor nerve activity but are related to physiologically abnormal motor endplate function, with the release of excessive

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acetylcholine and localized contraction, which may lead to local inflammation, nocioceptor stimulation and pain. This mechanism could account for localized increase in resting muscle tone.[5,6]

Myofascial trigger points (MTrP) in the cervical muscles constitute another potentially relevant muscle dysfunction leading to limited cervical spine mobility. These are defined as hyperirritable spots in skeletal muscle with a potential to give rise to characteristic referred pain, motor dysfunction, and autonomic phenomena. Motor aspects of MTrPs may include disturbed motor function, muscle weakness as a result of motor inhibition, and—most importantly in the context of this study—muscle stiffness and restricted range of motion.[7]

Zhongguo Yi Bao (2009) proposed that abnormal neck posture is associated with sympathetic symptom of degeneration which may include: headaches, abnormal functions of the eyes and the ears and psychological and mental disorders. An acceptable range of motion for flexion is 50 to 60 degrees. Cervical flexion restriction may result from forward head posture, taut cervical extensor, poor sleeping or sitting positions, watching T.V, working on a VDT unit where the head is flexed at an acute angle for extended periods of time, sleeping wrong on a couch or reading with too many pillows all can lead to the epidemic of restricted motion.[8]

Various researches have proposed that decreased cervical flexion ROM is associated with forward head posture. Abnormal posture also leads to major part of head, neck & shoulder pain including fibromyalgia, myofascial pain syndrome, tempomandibular joint dysfunction, muscle strain, disc herniations, arthritis, pinched nerves, instability and chronic fatigue syndromes.[8,9]

Paris *et al* (1999) described a technique called Inhibitive distraction technique (IDT) which originated from cranial osteopathy. In this technique therapist uses the fingers of both the hands to exert a sustained ventrocranial force on occiput just caudal to superior nuchal line.[2]

The effect of Inhibitive distraction technique involve inhibition of local and general posterior muscle tone, inactivation of suboccipital muscle trigger points, spasm of connective tissue between rectus capitis posterior minor muscle and the dura matter and gentle joint mobilization. These effects probably may reduce peripheral sensitization and indirectly reduce central sensitization also. This mobilization is also effective in activation of descending inhibitory pathway. Kristin Breim *et al* (2007) did not confirm immediate effects of ID on cervical flexion AROM & recommended for future research and clinical use of the technique.[10]

There is dearth of literature about a precise physical management by immediate effects of ID on range of motion. Therefore present study was design to find out the validity and application of inhibitive distraction, a myofascial technique & hence upgrading the rehabilitation protocol for subjects with restricted cervical flexion.

Methodology

Study design was experimental in nature.

Inclusion

Subjects both gender male and females of 20-27 years age group & Individuals with restricted cervical flexion less than 50° with Patients having forward head posture were included in this study.

Fig 1: Measurement of Cervical Flexion AROM (Starting Position)

Exclusion

Subjects with recent cervical spine surgery, traumatic injury to head & neck, Neurological dysfunction of cervical spine, Spondylarthrosis, rheumatoid arthritis, vertebral insufficiency were excluded from this study.

Instrumentation

Universal goniometer, Couch, Chair, stopwatch.

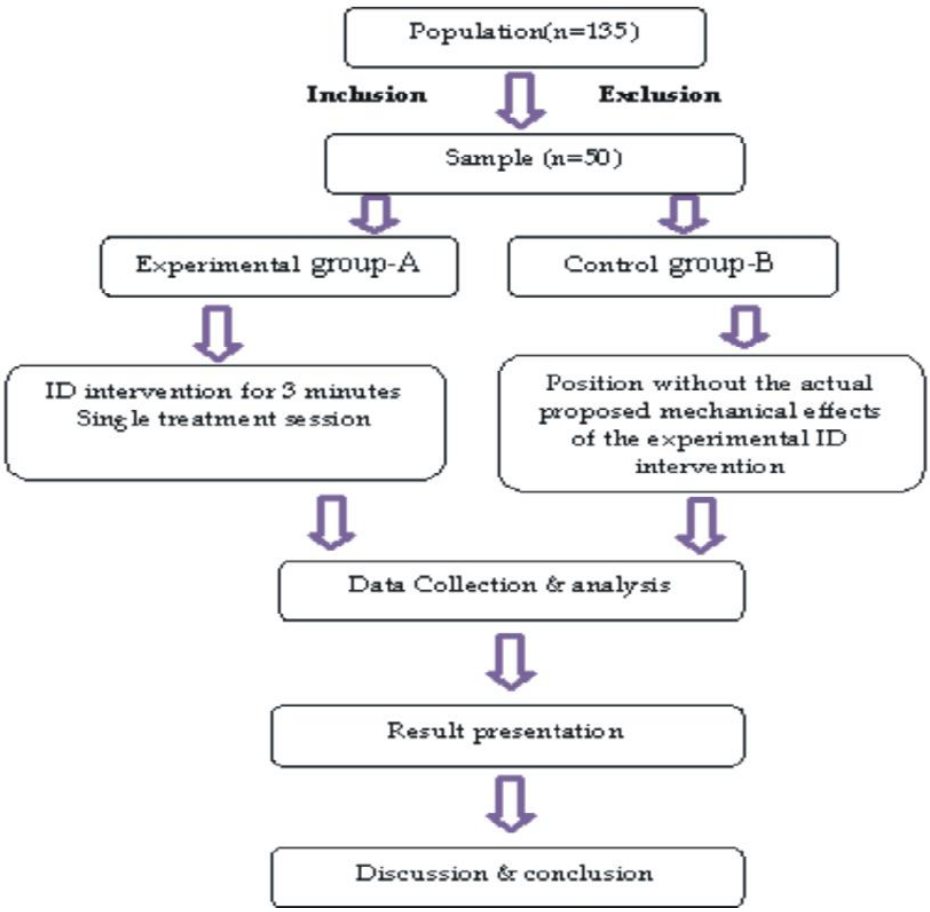
Procedure

The 135 subjects were invited to participate in the study, out of which 50 asymptomatic subjects were selected as per inclusion and exclusion criteria. A detailed explanation of the procedure was given after which the subjects were signed the informed consent. Group A and group B was assigned 25 subjects each between the age of 20-27 years. Cervical ROM was taken by universal goniometer and single intervention of ID technique was given to group A and sham (placebo) intervention was given to group B. again post intervention CROM was taken and comparison of post intervention was done.

Protocol

- For experimental group position of patient was Supine with head supported and eyes closed. Whereas Position of therapist was standing at the head end of patient. While hands resting on treatment table the pressure exerted was slow, maintained and then released slowly in upward & towards therapist by fingertips. The pressure applied was to long axis of muscle and tendon for 3

Flow Chart



minutes & then released slowly to achieve muscle inhibition during treatment. Single treatment session was given and reading was taken.[11]

- For control group position of patient was Supine with head supported and Position of therapist was standing at the head end of patient. Subjects will be resting their heads in the palms of the therapist for the same duration to mimic the treatment position as much as possible. In this way, these subjects received the effects of touch, warmth, and rest, without the actual proposed mechanical effects of the experimental ID intervention.[12,13]

Data Analysis

Statistics analysis were performed using statistical package software (SPSS) version 17 & Microsoft excel 2010. Intra group and inter group analysis was done to analyze and compare the intervention scores. t-test was used for group analysis. Significance level was set at $p \leq 0.05$.

Result

Intra group analysis showed significant improvement in both the groups. Inter group analysis revealed significant improvement in inhibitive distraction group when compared with the control group which can be seen by the mean difference which was statistically

Table 1: Comparison of M±SD between Post Treatment Values of Inhibitive Distraction Group (Group A) and Control Group (Group B)

Post treatment values	Mean ± St deviation	p value
Experimental group	50.15 ± 5.191	= 0.05
Control group	47.01 ± 3.070	

Fig 2: Intragroup Comparison of Mean and Standard Deviation for Pre Test and Post Test Readings for Group A and Group B

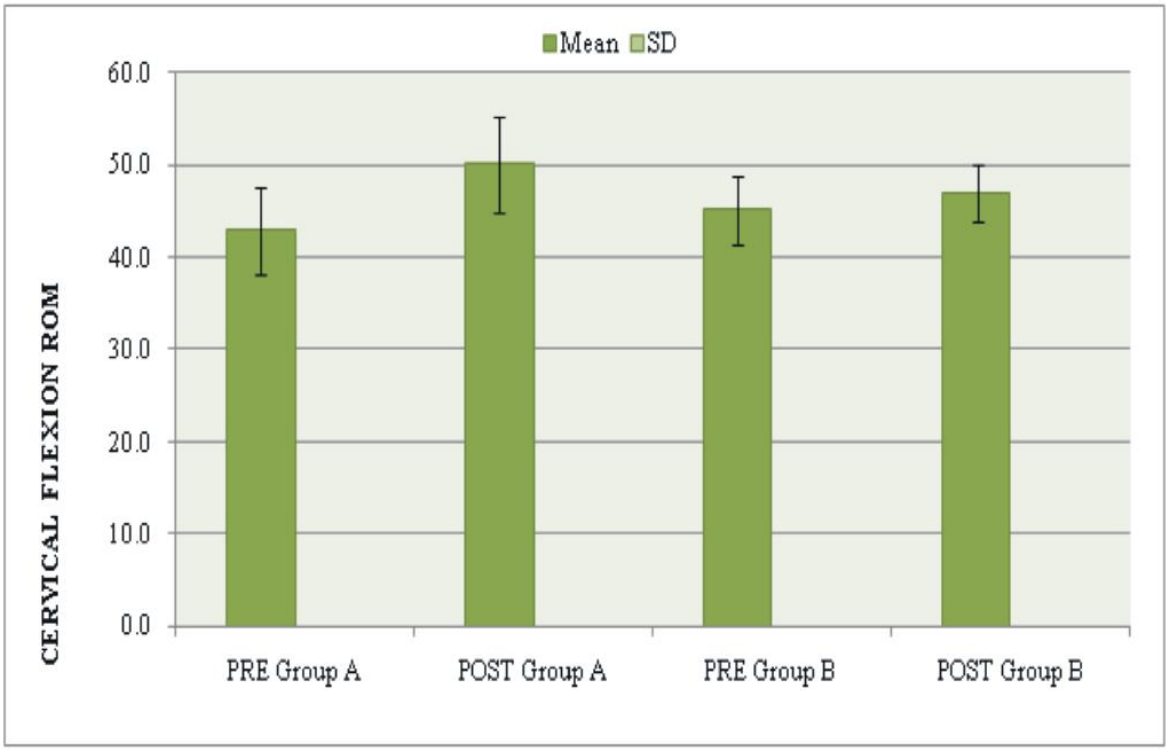


Fig3: Intergroup Comparison of M±SD between Post Treatment Values of Experimental Group (Group A) and Control Group (Group B)

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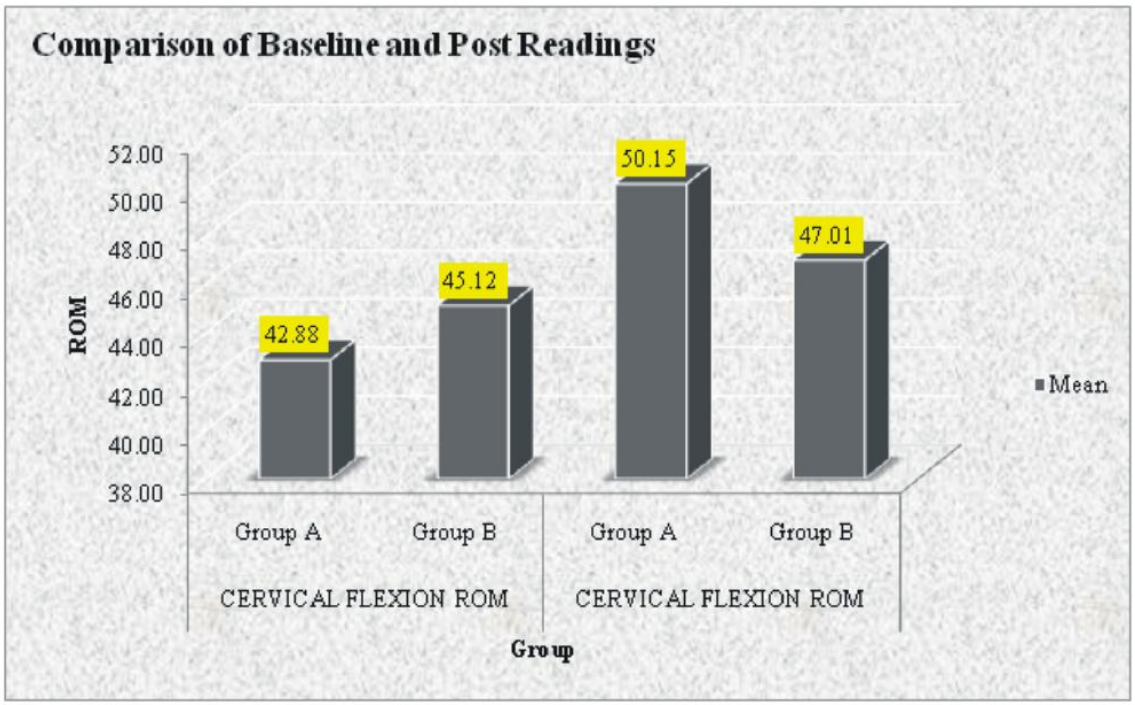

significant.

Discussion

The results of the present study supported the effectiveness of ID in the field of rehabilitation. Both the groups were found to be significantly improved in cervical flexion however, group A (ID group) improved more significantly than group B (control group).

As inhibitive distraction technique involves slow and sustained stretching of posterior cervical structures such as suboccipital muscles, ligaments & capsules which leads to firing of GTO & inhibits tension in the muscle, allowing the parallel elastic component (sarcomere) of the muscle to remain relaxed & lengthen, hence increasing cervical flexion ROM in experimental group.[14]

Other factors also can be attributed to significant improvement in experimental group like inhibition of local and general posterior muscle tone, inactivation of suboccipital muscle. It has been postulated that ID also deactivates MTrPs which in turn normalizes disturbed motor function, improve muscle strength and reduces muscle stiffness leading to increase range of motion.[7]

Paris *et al* proposed that decreased excitability of motor neurons and gentle joint mobilization, leading to relaxation of surrounding structures and hence influencing cervical flexion range.[2]

Cantu and Grodin described a fibrotic process in connective tissue, whereby it shrinks progressively, caused by arthrokinematic dysfunction, poor posture, overuse, habit patterns, or structural or movement imbalances. They further suggested that in many cases the surrounding musculature maintains a hypertonic recruitment pattern long after the inducing injury has healed, potentially immobilizing joints by the surrounding muscle hypertonicity.[4]

The placebo intervention may have been a confounding factor in that relaxation and touch may have had a positive effect on some subjects in the control group. The area of touch was large, which can result in raised temperature in the most superficial soft tissues.

Superficial heat increases the extensibility of collagen tissue, reduces muscle spasm, produces analgesia and hyperemia, and increases metabolism. However in the absence of a deforming force, heat will not alter collagen deformation during subsequent movement, and in any case the physiological effects would have been small and limited to the most superficial tissues.[15,16]

Conclusion

The study concluded that inhibitive distraction technique can significantly improve cervical flexion in asymptomatic subjects. Therefore inhibitive distraction technique should be employed while planning rehabilitation protocol for subjects having decreased cervical flexion range of motion which in turn will help in preventing the consequences like forward head posture, cervicogenic headache, mechanical cervical pain, in young population. Moreover ID technique can be used prior to any cervical manipulation for relaxation purpose.

Clinical Implications

The following study demonstrated the effectiveness of inhibitive distraction in increasing the flexion ROM in asymptomatic subjects. Therefore ID should be incorporated in the preventive rehabilitation program for management of consequences of decreased cervical flexion range.

Future Research and Limitation

- This inhibitive distraction technique can be compared with another technique which is effective in increasing cervical ROM.
- The study was done on a small sample size, and follow up was not conducted. So future research is necessary with a comparatively large sample size.

Conflict of Interest & Ethical Approval

There was no conflict of interest was reported among all authors. This research work was approved by ethical committee of HIPMS, HIHT University (UK) India.

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Original Article

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The Effects of Side of Brain Lesion on Balance and Activities of Daily Living in Stroke Patients

Sanjai Kumar*, Meenu Singh, Avikirna Pandey***, Sumit Raghav***, Gaurav Pratap Tyagi******

Abstract

Objective: The study was done to find out the difference in balance score and ADL Score between right and left sided stroke patients. **Methods:** The study was of an Analytical design, with 30 subjects, 20 were men and 10 were women, all subjects were right handed, assigned into two groups,15 subjects in each, according to the inclusion and exclusion criteria and carried out at Physiotherapy O.P.D. of CSS Hospital, Jai Multispecialty Clinic, Physiocare Clinic and residential care centre in and around, Meerut. In both group balance and ADL were assessed by using the BBS and mBI respectively. The collected data were of mean and standard deviation of balance score and ADL score, and has been analyzed using SPSS software. Mann Whitney U test was used to find the difference between the two groups. **Results:** The results showed that there were no significant difference in balance and ADL between right and left sided stroke with respect their balance score (p = 0.755). The result also showed that the activities patients were performing depended on their balance capability. So the balance of the patient does not vary with side of lesion on late recovery but it is inevitably impaired following stroke.

Keywords: Stroke; Lesion side; Balance and functional recovery.

Introduction

Stroke resulting from cerebro vascular accident is a common neurological impairment. After coronary artery disease and cancer of all type, stroke is the third commonest cause of death worldwide and most important single cause of serve disability in people living in the community. The prevalence of stroke is higher among Asians and in Indians. It is about 250 -300/100000 per year.[1-2] Stroke causes problems across multiple systems, including motor control, upper extremity function, gait and balance.[3] Balance is frequently disturbed following stroke because it is a complex process that requires an interaction between the sensory and motor systems. Balance is the ability to maintain equilibrium in a gravitational field by keeping the centre of mass of body over its base of support.[4]

Hemisphere difference has been reported in the area of motor programming. The left (dominant) hemisphere has a primary role in the initiation and sequencing of movements while the right (non-dominant) hemisphere has a role in sustaining the movements and posture. This finding suggests that the person with left hemisphere were able to make less use of sensory information to update and modify the direction of the movement than persons with right hemisphere damage because the left hemisphere is responsible for motor programming.[5,6]

Balance of the patient is strongly associated with functional measures than with laboratory measures of spontaneous sway and induced sway. Balance scales are specifically designed to measure the functional standing balance in a clinical setting and a strong validity and reliability has been demonstrated in stroke patient.[7,8]

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Statement of Study

Does there is a difference in balance score and ADL score between right and left sided stroke patients?

Aims and Objectives

To investigate the difference in balance score and ADL score between right and left sided stroke patients.

Materials and Methods

The purpose and procedure of the study was explained to the subjects and informed consent was obtained. There was no criteria regarding time or type of stroke. Demographic data was collected on behalf of Berg Balance Scale and Modified Barthel Index, along with side of weakness and number of attack, obtained from patients self reports and cross checked with patients relatives. The stage of lower limb recovery and voluntary control of involved leg was assessed using Burnnstrom stage of recovery. Patient were passively made to stand to find out their ability to stand for thirty second unassisted. Patient who had difficulties in understanding some compounds of scales had a practical demonstration of certain sub group of BBS. No verbal encouragement or feedback was provided throughout the procedure but patients were assured regarding prevention of fall. We asked their ability perform and independence in ADL using mBI. The entire assessment was taken on a single occasion.

Berg Balance Scale

The Berg Balance Scale validated for people with stroke, was used to measure the balance ability of people in the sample. Fourteen observable balance tasks, representing functional movements common in everyday life, such as standing up from sitting and picking up an object from the floor were tested. Each task is scored on a five point scale (0-4) with 0 indicating an inability or need for maximal assistance to complete the task or perform task. Following the guideline of the test developers, the maximum score of this test is 56 which indicated balance ability within normal range, 0-20 wheelchair bound, 21-40 walking with assistance, 41-56 independent.

Modified Barthel Index

The modified Barthel Index specifically measures the degree of assistance required by an individual on ten items of mobility and self care activities of daily living. It is an ordinal scale that comprises score for feeding mobility personal hygiene, ambulation, bowel and bladder ability and dressing skills. Level of measurements are limited to either complete independence or needing assistance. Each performed item is assessed on an ordinal scale with a specified number of points assigned to each level of ranking. The maximum score is twenty (20). Barthel Index is easy to administer and reliability is proven for functional evaluation in patients with stroke. A score of 20 indicated independence, score of 18-19 indicated light dependence, score of 16-17 indicated moderate dependence and score of 15 or less indicated severe dependence.

Hypothesis

Experimental Hypothesis: There may be a significant difference in balance and ADL scores between right and left sided stroke patients.

Null Hypothesis: There may not be a significant difference in balance and ADL scores between right and left sided stroke patients.

Significance

This research should be able to give concrete base line information regarding the difference in balance and ADL between right and left sided stroke patients.

The result of this study would be widely applied in clinics as well as community

rehabilitation.

This research would upgrade the professional skills and show the path for future research.

Limitation of Study

- Small sample size.
- The selection criteria was not based on artery lesion.
- The subjects had variable level of recovery in their upper and lower limbs.
- Only lower limb recovery was considered.

Convenient sample of 30 subjects, according to the inclusion and exclusion criteria, randomly assigned into two groups were include in the study. The study was conducted at Physiotherapy O.P.D. of CSS Hospital, Jai Multispecialty Clinic, Physiocare Clinic and residential care centre in and around, Meerut.

Variable

Dependent Variable: Balance score and ADL score.

Independent Variable: Side of Brain Hemisphere Lesion.

Inclusion Criteria

- Patient with first stroke.
- Able to maintain independent stance for 30 seconds.
- Burnnstrom stage of recovery IV.
- Subjects with unilateral stroke.

Exclusion Criteria

- Any other Neurological condition other than stroke that can interfere with balance and ADL.
- Cognitive and psychiatric problems.
- Marked auditory and visual impairments.
- Major orthopedic problems.
- Patient with ataxia.
- Patients more than 70 years of age.
- Impaired ability to follow simple verbal instruction.

Instrumentation

- Ball
- Chair
- Inch tape
- Pen
- Stationary
- Stool
- Subjects (30)
- Stop Watch.

Protocol

After getting their informed consent the subjects were randomly assigned into two groups.

Control Group [Group 1]: 15 subjects (14 males & 1 female)

Experimental Group [Group 2]: 15 subjects (6 males & 9 females)

To measure the stage of lower limb recovery and voluntary control of involved leg Burnnstrom stage of recovery method was used and balance was assessed on behalf of Berg Balance Scale. While the ADL was assessed on behalf of Modified Barthel Index. No verbal encouragement was provided to the subjects but the subjects were assured regarding the prevention of fall and the data was collected.

Data Acquistition

Data was collected in a quiet room for each subjects by the same investigator. Data was collected in the data collection form along with other details of the subjects.

Data Analysis

Statistically the characteristics of the groups and the results within and between the groups were compared. This data was analyzed by using Maan Whitney U test to find the difference between the two groups through SPSS software.

Results

In this study 30 subjects were used, who were suffering from either right and left side brain lesions, randomly assigned into two groups i.e. control and experimental.

According to gender wise, 93.3% males & 6.1% females were affected from the right side stroke while 33.3% males & 66.7% females were affected from the left sided stroke.

According to the age and side involvement, mean age for right sided stroke patient were 56.07 ± 9 years and for left sided stroke patients were 60.47 ± 6 years. The p – value of right side group was 1.531 and the p – value of left side group was 0.137. So there was no significant difference between the two groups with respect to age.

According to the Berg Balance Scale, the mean value of score for right sided stroke patients were 35.73 ± 4.43 and for left sided stroke patients were 35.40 ± 4.42, while the z-value, which is based on Mann Whitney U

Table 1: Gender Wise Distribution of Subjects with Sidewise Distribution

Side Involvement	Sex		Total
	Male	Female	
Right	14	1	15 100 %
Left	6	9	15 100 %

Table 2: Age with Side Involvement

Side Involvement	N	Minimum Age	Maximum Age	Mean	Standard Deviation	t - Value and p - Value
Right	15	40	69	56.07	9.00	1.531
Left	15	49	70	60.47	6.56	0.137

Table 3: BBS Score for Both Groups

Side involvement	N	Minimum BBS Score	Maximum BBS Score	Mean	Standard Deviation	Z - Value P - Value
Right	15	27	42	35.73	4.43	0.313
Left	15	28	42	35.40	4.42	0.755

Figure 1: Mean BBS Score

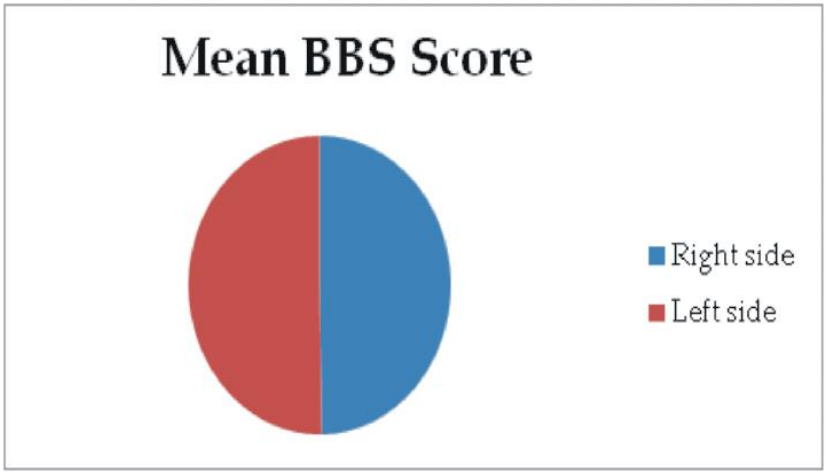


Table 4: BI Score for Both Groups

Side Involvement	N	Minimum BI Score	Maximum BI Score	Mean	Standard Deviation	Z - Value P - Value
Right	15	7	17	11.80	2.08	0.617
Left	15	10	16	12.53	1.77	0.538

Figure 2: Mean BI Score

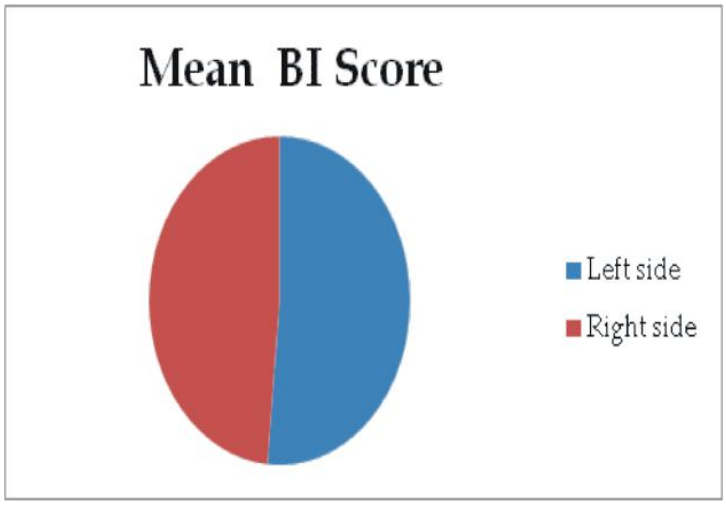
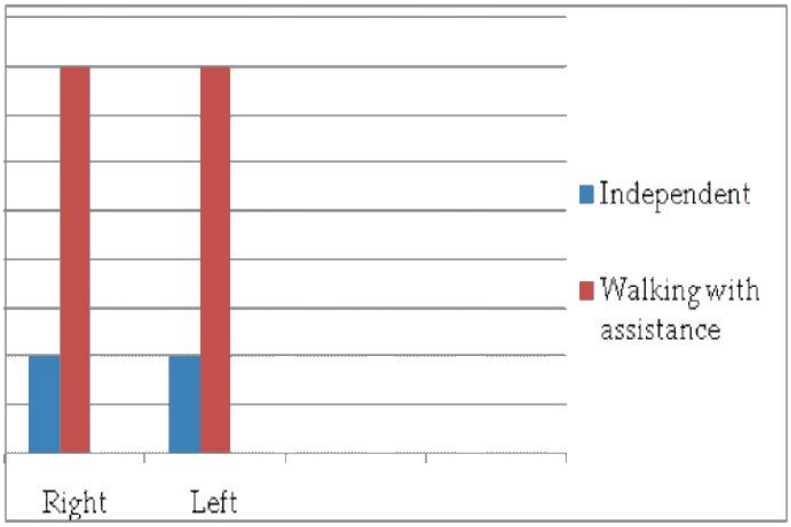


Figure 3: Distribution of Subjects Based on BBS Score



test was 0.313 for right sided & 0.755 for left sided stroke patients. So there was no significant difference between two groups with their balance score.

According to the Modified Barthel Index, the mean value of score for right sided stroke patients were 11.80 ± 2.08 and for left sided stroke patients were 12.53 ± 1.77, while the z-value, which is based on Mann Whitney U test was 0.617 for right sided & 0.583 for left sided stroke patients. So there was no significant difference between two groups with their mBI score.

According to the BBS, in both right and left sided stroke patients 20% were in the category of independent and 80% were in the category of walking with assistance. While according to mBI score, in right sided stroke patients 100% were under severe dependence and in left sided stroke patients 6.7% were moderate dependent and 93.3% were severely dependent for activity of daily living.

Figure 4: Distribution of Subjects Based on mBI Score

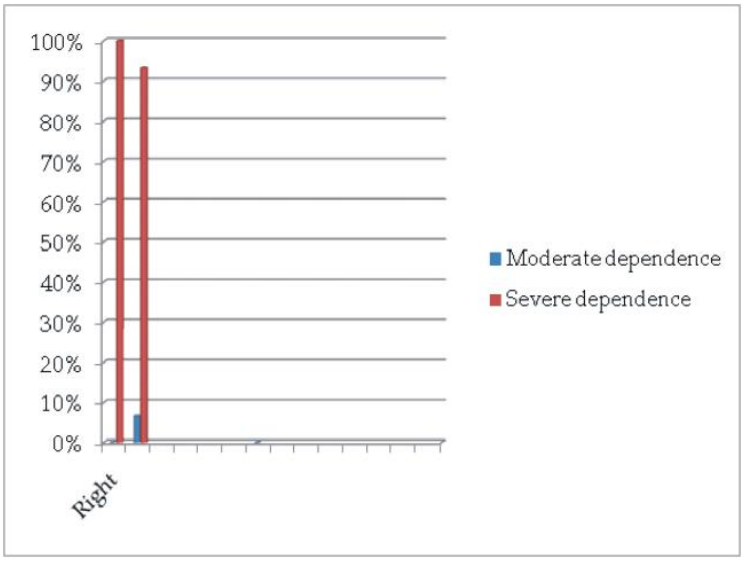


Table 5: Correlation between BBS and mBI for Right and Left Sided

	BBS		BI	
	Right	Left	Right	Left
Correlation coefficient	0.556	0.607	0.556	0.607
P - Value	0.031	o.016	0.031	0.016
N	15	15	15	15

The correlation between the balance score and activities of daily living for right and left sided stroke patients was assessed on behalf of correlation coefficient and p-values of both the group. The correlation coefficient value for both the group was 0.556 and 0.607 while the p-values of both the group was 0.031 and 0.016, which shows that there was a positive correlation between balance score and BI score in both the groups.

Discussion

In the present study we tried to find out the difference in balance and ADL of patients with right and left sided brain lesions. The ability to maintain balance is fundamental for ADL requiring upright mobility such as transfer and walking. Control of sitting and standing balance have been shown to be important milestones in the recovery of stroke and the focal part of rehabilitation is the facilitation of balance control.

The present study demonstrated that there was no significant difference in balance between the right and left sided stroke patients as p – value is 0.755.

In the present study all patients were able to stand for 30 seconds unassisted. Laufer *et al* suggested that the patients who were able to stand independently, one and two months following stroke, found no difference in balance between right and left hemisphere.[9]

Though there was no difference in balance between the right and left hemisphere damaged patients, balance was invariably impaired in both groups, the minimum score was 36 and maximum score was 42 out of 56.

In present study we found that there is no difference between two groups with respect to BI score but BI score was less in both the groups. Most of the patients were in the category of severe dependency for their daily activities. The reason for impairment in ADL was because upper limb recovery was incomplete and BI consists of activities like

grooming, toilet use, feeding and dressing which requires usage of upper extremity. The present study also indicated that there was an association between balance of patients and the activities which can be performed.

The study also showed that there was no association between the balance score and the gender of the patients. This is similar to previous studies which indicated that gender of patients was not a predictor of functional skill acquisition in stroke. Keenan *et al* suggested that balance of patients was not found to be dependent on gender.[10] Macciocchi et al to establish the relation between genders of patients with functional outcome and found that there was not a predictor of functional outcome in patients with stroke.[11] The restoration of balance skills is a cornerstone of stroke physiotherapy. Some or all of these tasks generally become more difficult in stroke patients.

Future Research

1. Future studies may be done with more no of subjects.
2. Future studies may be done to evaluate difference in balance with specific artery differentiation.
3. Future studies may be done to find out the difference in balance between patients with and without spatial problems.

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Letter to Editor

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Holistic Rehabilitation of the Paediatric Cancer Patient in India: A Physiotherapist's Expedition of Three Years

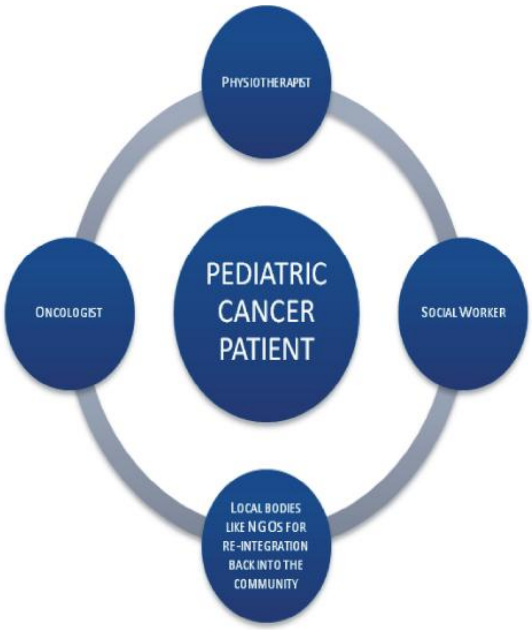
Pavithra Rajan

The successful rehabilitation of a pediatric cancer patient is a challenging process, as it involves not only medical rehabilitation of the patient, but also psychosocial rehabilitation of the family.[1] In India, the holistic rehabilitation of the pediatric cancer patient is especially difficult, as there is a lot of stigma associated with the disease.[2] Pediatric cancer patients in Intensive Units, hospital wards, Outpatient departments, and community settings in India were treated from 2005 to 2008 using different treatment strategies, depending on the setting and available resources. Detailed interactions, as a part of treatment protocol, with the pediatric patients and most importantly, with the families were done as a part of treatment protocol at the treating centres. The author has learnt certain effective strategies over a span of three years of rehabilitation with pediatric cancer patients, which are discussed in this short write up.

Many 'gaps' in the existing system of holistic cancer care were noted. When the child is admitted in the hospital for cancer treatment, the focus lies largely on the "medical aspects". However, many problems are faced by the child after successful completion of the treatment. Certain major issues are re-integration into society[2], caregiver support [3], and future of the child including education and career.[4,5]

While the treatment is focused on solely the medical aspects, 'psychosocial rehabilitation' seems to lack focus. These problems may or may not fall within the purview of the physiotherapist; however referral to the right professional at the right time helped alleviate some of these problems (see Figure 1). An example of this could be referring to a local NGO to take care of the education and smooth integration of the patient into the community. It is important to ensure holistic rehabilitation of the pediatric cancer patient. Irrespective of what falls within the purview of the physiotherapist, core issues need to be addressed by timely referrals to the right health care professionals. A good referral

Figure 1: Showing the Proposed Referral System for Holistic Rehabilitation of the Pediatric Cancer Patient



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system needs to be incorporated into the current health system to ensure holistic care of the cancer pediatric patients in India.

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Article in supplement or special issue

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