Physiotherapy and Occupational Therapy Journal

POTJ

The Physiotherapy and Occupational Therapy Journal's (ISSN 0974 – 5777) on topics pertaining to physical therapy and rehabilitation. Coverage includes geriatric therapy, pain management techniques, cardiac, orthopaedic and pulmonary rehabilitation, working with stroke patients, occupational therapy techniques and much more. The editorial contents comprise research papers, treatment notes and clinical observations, case histories, professional opinion and memoirs and comments on professional issues. The Editorial Board's mission is to publish significant research which has important implications for physiotherapy and occupational therapy. Our vision is for the journal to be the pre-eminent international publication of the science and practice of physiotherapy and occupational therapy.

Subscription Information

	One Year
India	Rs.5000
All Other Countries	$ 200

Discount for agents 10%. Orders and subscriptions send to the following address of **Red Flower Publication Pvt. Ltd, Delhi.**

Printed at

R.V. Printing Press
C-97, Okhla Industrial Area
Phase-1, New Delhi 110 020

Indexing information:
Index Copernicus, Poland
EBSCO Publishing's Electronic Databases, USA

Corresponding address
Red Flower Publication Pvt. Ltd.
41/48, DSIDC, Pocket-II, Mayur Vihar, Phase-I
P.O. Box No. 9108, Delhi - 110 091 (India)
Tel: 91-11-65270068, 43602186, Fax: 91-11-43602186
E-mail: redflowerppl@vsnl.net, Website: www.rfppl.com

Physiotherapy and Occupational Therapy Journal

POTJ

January - March 2011
Volume 4, Number 1

Contents

Physiotherapy and Occupational Therapy Journal
Volume 4 Number 1, January - March 2011

Comparison of Cyriax Capsular Stretch Versus Posterior Glide in Treating Adhesive Capsulitis of Shoulder

Niti Khurana*
Abha Sharma*
Sumit Kalra**

ABSTRACT

Objective: The main objective of the study was to compare two mobilization techniques and to see which of the two techniques gave faster rate of improvement in range of motion and reduction in pain in patients with adhesive capsulitis of shoulder. **Methodology:** 35 patients were selected for the study of which 28 were included as per the inclusion criterion. The 28 selected were randomly assigned into the experimental and the control groups respectively. Patients with more than 50% restriction in range of motion along with capsular pattern of restriction of ROM were included in the study**.** The subjects were given with Cyriax capsular stretch(in experimental group A)andPosterior glide of the shoulder(in control Group B) for 15 minutes along with active and passive exercises at the affected shoulder for 14 sittings and SPADI and VAS were noted on the 1^{st},7^{th}& 14^{th}day. **Result :** This study shows that even though extent of increase in range of motion, at day 7 and day 14, Group A showed significantly higher degree of abduction as compared to that of Group B, but when comparing both the groups in overall percentage improvement, the mean percentage change in Group A was higher as compared to Group B for all the variables, yet for all the variables result was statistically insignificant. **Conclusion:** There was no significant difference between the two approaches, so either of the techniques can be used for management of adhesive capsulitis.

Key Words : Adhesive capsulitis, Cyriax capsular stretch, Posterior glide of shoulder, Capsular restriction of pattern of movement.

INTRODUCTION

Stiff shoulder which is characterized by loss of motion, is one of the most common musculoskeletal disorders encountered in daily orthopedic practice and remains challenging to treat[1]. Over the years the stiff shoulder was labeled initially periarthritis by Duplay in 1872, the frozen shoulder by Codman in 1934 and later adhesive capsulitis by Neviaser in 1945. Adhesive capsulitis of the shoulder is characterized by insidious onset and progressive pain , loss of active and passive mobility of glenohumeral joint [2]. Primary adhesive capsulitis is used to describe an insidious onset of painful stiffness of glenohumeral joint and secondary adhesive capsulitis on the other hand is associated with a known predisposing condition of the shoulder eg. Humerus fracture, dislocation of shoulder, avascular necrosis, osteo-arthritis of shoulder or stroke) [3]. Prevalence of adhesive capsulitis in general population has been estimated to be in between 3 5% and it arises from idiopathic or post traumatic causes. Adhesive

Author's Affiliation: *Lecturer, **Clinical Therapist BCIP, *Clinical Therapist, Banarsidas Chandiwala Institute of Physiotherapy, Chandiwala Estate, Kalkaj, New Delhi.

Reprint's request: Niti Khurana, Therapist, Banarsidas Chandiwala Institute of Physiotherapy, Chandiwala Estate, Kalkaji, New Delhi.

(Received on 02.03.2011, accepted on 24.05.2011)

capsulitis is the main cause of shoulder pain and dysfunction in midddle aged and elderly population. The factors associated with it are: gender, trauma, immobilization, diabetes, stroke, myocardial infarction, thyroid disorder, reflex sympathetic dystrophy, autoimmmune disorder, cervical disorder [4]. The pathogenesis of primary frozen shoulder is unknown. In 1945, Neviaser was the first to attempt to implicate shoulder capsule adhesion as the etiology of the adhesive capsulitis (frozen shoulder), since then several authors have agreed with his proposal [5]. More recently, orthography and arthroscopy have been used to investigate the involved tissues. In adhesive capsulitis loss of dependent fold, decreased capsular volume and capsular contractions have been demonstrated, in addition contracture of coracohumeral ligament adhesions of subacromial bursa, rotator interval thickening have all been reported [6]. Vermeulen et al also in their study indicated that in adhesive capsulitis the capsular extensibility is decreased, axillary recess becomes adherent and the flexibility of the biceps tendon in its sheath is reduced, as a result the external rotation of its humeral head to pass under the acromion during abduction is severely restricted [7]. On pathologic examination of the shoulder joint capsule, in adhesive capsulitis the capsule tends to be contracted, thickened and closely adherent to the humeral head, contributing to limitation of movement. In adhesive capsulitis, limitation of external rotation with arm in abduction is typically associated with anteroinferior capsular restriction, whereas limited internal rotation and horizontal adduction are associated with a posterior capsular restriction. The capsular pattern is designated by a hard end feel and limitation of three passive motions in fixed proportions limitations of medial rotation is slight, abduction is more pronounced and that of lateral rotation is marked [14]. Cyriax proposed that tightness in a joint capsule would restrict motion in a predictive pattern that is the capsular pattern, for the shoulder capsular pattern is one in which the external rotation is more limited than internal rotation [8].

Currently no standard medical or surgical or therapy regimen is universally accepted as the most efficacious treatment for restoring motion in patients with adhesive capsulitis, While physical therapy is most commonly prescribed for adhesive capsulitis[9]. A considerable number of patients with adhesive capsulitis are treated with non steroidalanti inflammatory drugs (NASIDs), intra-articular cortico steroid infections and physiotherapy. In persistent cases, more aggressive interventions such as arthroscopic release, hydrodilatation, or mobilization under anesthesia have been used, with respect to physiotherapy treatments, variety of interventions are being used like hot-packs, ultrasound, interferential therapy, transcutaneous electrical neuromuscular stimulation, active and passive range of motion, exercises, peripheral neuromuscular facilitation and various mobilization techniques [10].

In many physical therapy programs, mobilization techniques are an important part of the interventions. Identifying the stage of adhesive capsulitis in which a patient is presenting, it is important to determine the appropriate treatment regimen. Exercises are the key to any treatment protocol for adhesive capsulitis.

In the present study comparison between the clinical efficacy of the two methods of mobilization that is Cyriax Capsular Stretch versus Posterior Glide of the glenohumeral joint in patients with adhesive capsulitis of the shoulder and to infer which immobilization techniques gives better andearly increase in range of motion and reduction in pain in patients with adhesive capsulitis of the shoulder.

METHODOLOGY

The subjects were selected from Physiotherapy OPD's of BanarsidasChandiwalaInstitue of Medical Sciences and BanarsidasChandiwala Institute of Physiotherapy. 35 patients were selected for the study of which 28 were included as per the inclusion criterion. The 28 selected were randomly assigned into the experimental and the control groups respectively.

Inclusion Criteria

Age Group 30-60 years, Unilateral Adhesive Capsulities, pain and restriction of range of motion of more than 3 months, Capsular pattern of restriction of range of motion, Diabetics with shoulder pain were included.

Exclusion Criteria

Rheumatoid Arthritis, Osteoarthritis of the Shoulder, Neurological Diseases, Cervical RadiculoPathies, Presence of medical conditions such as cardiac diseases, infections, coagulation disorders, Post traumatic fracture and dislocation of the shoulder, elbow and hand. Reflex Sympathetic Dystrophy, Rotator Cuff Tears, Soft tissue injuries around the shoulder complex ,Manipulation under anaesthesia for adhesive capsulities of shoulder, intraarticular steroidal in filteration of the shoulder, Malignancies, Osteoporosis and all the conditions contraindicated for mobilization.

The subjects were randomly assigned to two groups the Experimental group/Group A and the Control group/Group B. Group A: The subjects were given hot packs along with Cyriax capsular stretch for 15 minutes along with active and passive exercises at the affected shoulder daily for 14 sittings and SPADI and VAS were noted on the 1^{st},7^{th}& 14^{th}day.Group B: The subjects were given hot packs along with Posterior glide of the shoulder along with active and passive exercises

RESULTS

Table 1. Comparison of Extent of Ranges in Two groups at different time intervals

Movement	Time interval	Group A		Group B		"t"	"p"
		Mean (in degrees)	SD	Mean (in degrees)	SD		
Flexion	Day 1	131.4	13.6	120.4	22.4	1.579	0.126
	Day 7	153.2	11.0	138.6	21.3	2.288	0.030
	Day 14	170.7	9.2	154.3	20.8	2.700	0.012
Abduction	Day 1	100.0	20.3	92.1	15.9	1.141	0.264
	Day 7	123.2	18.3	110.4	19.3	1.813	0.081
	Day 14	155.4	12.0	123.9	21.4	4.791	<0.001
Internal Rotation	Day 1	50.7	14.7	45.8	11.6	0.988	0.332
	Day 7	66.8	9.9	54.0	12.5	3.001	0.006
	Day 14	76.8	6.4	61.1	14.0	3.814	0.001
External Rotation	Day 1	23.9	9.4	18.6	9.3	1.513	0.142
	Day 7	41.1	13.2	28.2	9.9	2.916	0.007
	Day 14	58.6	9.1	40.0	12.4	4.521	<0.001

Table 2. Comparison of Change in range of motion in two groups at different time intervals (Percentage change from baseline)

SN	Parameter	Group A		Group B		"t"	"p"
		Mean	SD	Mean	SD		
1.	Flexion	30.8	11.0	29.9	8.7	0.249	0.805
2.	Abduction	35.9	11.3	34.6	7.2	0.360	0.722
3.	Internal rotation	65.2	56.3	38.9	32.7	1.512	0.142
4.	External rotation	206.2	234.3	150.3	108.2	0.811	0.425

Table 2. Comparison of Change in range of motion in two groups at different time intervals (Percentage change from baseline)

SN	Time interval	Group A		Group		"t"	"p"
		Mean	SD	Mean	SD		
1.	Day 1	51.5	15.5	48.8	12.8	0.508	0.616
2.	Day 7	36.4	12.9	33.1	12.8	0.686	0.499
3.	Day 14	23.9	10.6	20.7	9.2	0.855	0.400

Table 4. Comparison of Percentage VAS in two groups at different time intervals

SN	Time interval	Group A		Group B		"t"	"p"
		Mean	SD	Mean	SD		
1.	Day 1	8.1	1.5	7.9	1.9	0.330	0.744
2.	Day 7	6.4	1.5	6.5	1.9	-0.220	0.828
3.	Day 14	4.5	1.6	5.0	2.1	-0.721	0.477

at the affected shoulder daily for 14 sittings and SPADI and VAS were noted on the 1st,7th & 14th day

Percentage Improvement in Range of Motion Though the mean percentage change in Group A was higher as compared to Group B for all the variables, still for all the variables the difference between two groups was not statistically significant.

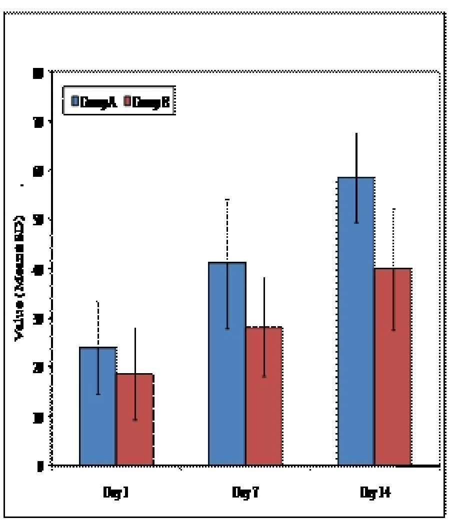
PAIN AND DISABILITY INDEX

Extent of pain and disability in the two groups was assessed on two parameters: Shoulder pain and disability index, and Visual Analogue Score for pain. Shoulder Pain and Disability Index (SPADI) was measured on a scale with maximum score 130, the scores being shown here are percentage scores. the difference between two groups was not significant, though at each time interval the SPADI of Group B was lower as compared to that of Group A (p>0.05). VAS (Pain) the difference between two groups was not significant, though at each time interval the VAS of Group B was lower as compared to that of Group A (p>0.05).

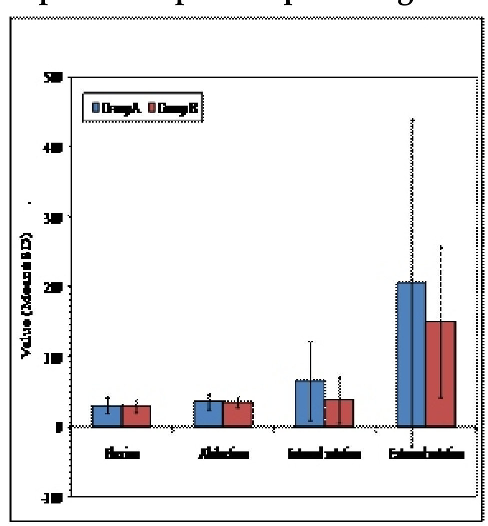
DISCUSSION

Goals of the treatment are to reduce pain ,increase range of motion and to improve

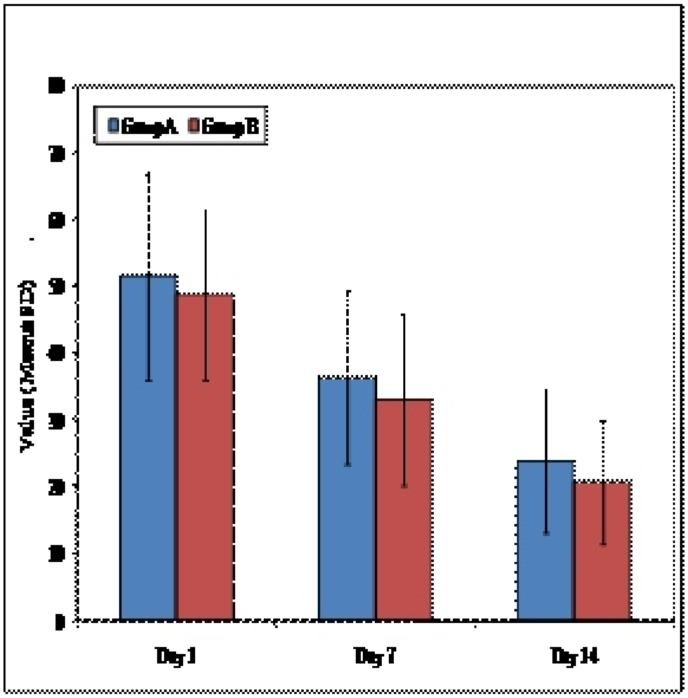
Graph 5. Percentage improvement in ROM



Graph 6. Comparison percentage SPADI



Graph 7. Percentage improvement VAS



function, although literature data lacks a consensus on non operative approach for the treatment of adhesive capsulitis, it is still the primary intervention .When this fails ,operative treatment which either be manipulation under anesthesia alone or in combination with arthroscopic capsular release may be reasonable options and appear to produce satisfactory results in most cases.[4] The efficacy of treatment for shoulder symptoms have evaluated in randomized comparative studies so far. Based on the limited quality of high grade evidence , it has also been concluded that the treatment procedure have no superiority over each other in long term but difference may exist in early phase of treatment .[4]which is again proved by this study that there has been marked improvement in group A on day 7 and on day14. In comparing the external rotation in both the groups on day 7 and day 14, not only the mean extent of external rotation in Group A was higher as compared to Group B but the difference between two groups was statistically significant too ($p<0.05$). At day 7 the mean extent of external rotation in Group A was 41.1±13.2° while in Group B it was 28.2±9.9°, showing a statistically significant difference between two groups ($p=0.007$). At day 14, the mean extent of external rotation two in Group A was 68.6±9.1° while in Group B it was 40.0±12.4°, once again showing a statistically significant difference between two groups ($p<0.001$) ,but when comparing both the groups in overall percentage improvement, the mean percentage change in Group A was higher as compared to Group B for all the variables, still the difference between the two grous was not statistically significant. Our results support the study of Griggs et al (2000) who reported that following a physical therapy programme consisting of passive stretching exercises patients demonstrated a reduction in pain score from n1.57 to 1.16 in a range from one to five points, improvements in active range of motion, and 64 patients reported a satisfactory outcome. The mechanism by which Capsular stretching caused improvement in shoulder range of motion and function could be elongation of tissues which could be the probable reason helping to improve range of motion and function after Capsular stretching. Conventional physical therapy measures require instruments along with a therapist and the patients are strictly advised to attend their daily outpatient therapy in the hospital. However the treatment protocol might occasionally be interrupted due to problems of time and transportation. The Cyriax method requires fewer hospital visits, enabling the patients to proceed in their daily and professional activities. No special equipment is needed for the method but only an experienced health professional competent in the technique. The manipulation used during the Cyriax approach is mild and does not require anesthesia. It provides a health-care advantage during the active treatment period and this is of major importance for both the patient and the overloaded physical .therapy clinics of referral hospitals.[3]

CONCLUSION

As per the results of the present study it can be concluded that there was no significant difference between the two approaches, so either of the techniques can be used for management of adhesive capsulities.

REFERENCES

1. Jiu-jenq Lin, Jing-Lan Yang, Reliability and validity of shoulderatightnessmeasurementinpatients with stiffshoulders, ManualTherapy. 2006; 11: 146-152.
2. HenricusMVermeulenetal,Comparisonofhigh grade and low grade mobilization techniques in the management of adhesive causalities of the shoulder: Randomizedcontrolledtrial,Physical-Therapy. 2006; 86(3): 356-368.
3. Fusun Guler-Uysal, Erkan Kozanoglu, Comparison of the early response to two methods of rehabilitation in adhesive causalities, SWISS MED WKLY. 2004; 134: 353-358.
4. Jing-lan Yang,Chein-wei Chang, Shiauyee Chen, Shwu Fen Wang, Jiu-jenq Lin Mobilization techniques in subjects with frozen shoulder syndrome: Randomized Multiple Treatment trial, Physical-Therapy. 2007; 1307-1315.
5. Jing-lan Yang, Chein-wei Chang, Shiauyee Chen, Shwu Fen Wang, Jiu-jenq Lin Mobilization techniques in subjects with frozen shoulder syndrome: Randomized Multiple Treatmenttrial, Physical-Therapy. 2007; 1307- 1315.
6. Jiu-jenq Lin, Jing-LanYang, Reliability and validity of shoulder tightness measurement in patients with stiffshoulders,ManualTherapy. 2006; 11: 146-152.
7. Margareta Nordin & Victor H. Frankel. Basic Biomechanics of themusculoskeletalsystem, 3rd edition, Lippincott Williams & Wilkins. 2001.
8. J. H. Cyriax & P.J. Cyriax, Cyriax's illustrated manual of orthopedic medicine 2nd edition, Butterworth & Heinemann. 1983.
9. Peter J Rundquist, Donald D. Anderson, Carlos A. Guanche, Paula M. Ludewig, Shoulder Kinematics in Subjects with Frozen Shoulder, Archives Physical Medicine Rehabilitation. 2003; 84: 1473-1479.
10. Andrea J. Johnson, Joseph J. Godges, Grenith J. Zimmerman, Leroy L. Ounanian, The Effect of Anterior Versus Posterior Glide Joint Mobilization onExternalRotationRangeofMotioninPatients With Shoulder Adhesive Capsulities, journal of orthopedic & sports physical therapy. 2007; 37: 388-100.
11. May S. F. Leung, Gladys L.Y. Cheing, effects of deep and superficial heating in the management of frozen shoulder, J Rehabil Med. 2008; 40: 145-150.
12. King kaew Pajareya, Navaporn Chadchavalpanichaya, Somluck Painmanakit,Chanjira Kaidwan Patcharin Puttaruksa, Yananee Wongsaranuchit Effectiveness of Physical Therapy for Patients with Adhesive Capsulities: Randomized Controlled Trial, J Med Assoc Thai. 2004; 87(5): 473-80.

13 Kingkaew Pajareya, Navaporn ChadchavalpanichayaSomluckPainmanakit, anjira Kaidwan Patcharin Puttaruksa Yananee Wongsaranuchit Effectiveness of Physical Therapy for Patients with Adhesive Capsulities: a RandomizedControlledTrial,JMedAssocThai. 2004; 87(5): 473-801.

14 J. H. Cyriax & P.J. Cyriax, Cyriax's illustrated nnual of orthopedic medicine 2nd edition, Butterworth & Heinemann. 1983.

Effect of saline instillation on haemodynamic parameters during endotacheal suctioning in patients with pulmonary infections: A randomized controlled trial

Muthukumaran S.
Prem V.
Vaishali K.

ABSTRACT

Objective: Saline instillation is one of the ways to improve secretion removal during endotracheal suctioning. In the present study we compared the saline instillation to no saline instillation group on haemodynamic parameters. **Design**: Randomized Controlled trial. **Settings**: Fifty - bedded mixed intensive care unit of a tertiary care teaching institute. **Materials and Methods**: The study included sixty mechanically ventilated subjects, diagnosed with pulmonary infections were randomly assigned to saline and no saline group with thirty subjects in each group. Following single session of suctioning procedure, haemodynamic parameters such as oxygen saturation, heart rate, blood pressure, and respiratory rate were measured at baseline, immediate and 1st, 2nd, 3rd, 4th, 5th, 10th, 15th and 30th minutes. **Measurements**: Two way ANOVA was used to find the difference between two groups. Comparison between groups with respect to baseline data was done by Mann-Whitney U test. Results: Comparison of two groups on oxygen saturation resulted in significant decrease in saline group compared to no saline group ($P<0.05$).The extent of reduction was 98% to 95% with significant drop at 2nd, 3rd and 5th minutes. There was no significant difference between groups on heart rate, blood pressure, and respiratory rate. **Conclusion**: The present study concludes instillation of saline for secretion removal to be used judicially as it leads to decreased oxygen saturation.

Key words: Endotracheal suctioning, Pulmonary infections, Saline instillation.

INTRODUCTION

In intensive care unit pulmonary infection is a common clinical problem, it leads to morbidity and mortality of critically ill patients. Airway obstruction in critically ill patients is caused by retained secretion, foreign bodies, and structural changes such as oedema, tumour, or trauma. Retained secretions increase airway resistance and the work of breathing and likely to cause hypoxemia, hypercapnia, atelectasis and infection. Difficulty in clearing secretions may be due to their thickness or to the patient's inability to generate an effective cough. [1]The removal of airway secretions is required for patients in the intensive care setting, because these patients breathe solely through an artificial airway, clearance is essential. Partial or total airway occlusion can lead to several serious physiological abnormalities and even death. [2] Suctioning involves application of negative pressure to the airway through a collecting tube to remove retained secretions. [1]

Endotracheal suctioning is required to maintain a patent airway for optimal ventilation and oxygenation. Additionally, critically ill patients often have too weak a cough to move secretions from the bronchi to the tip of the endotracheal tube. Several techniques intended to enhance the removal of secretions have emerged over the past few years. One such technique is the

Author's Affiliation: Department of Physiotherapy, Kasturba Medical College, Manipal University, Mangalore.

Reprint's request: Prem V., Department of Physiotherapy, Kasturba Medical College, Manipal University, Mangalore., Email id: prem.v@manipal.edu, Contact No: 9886647732.

(Received on 20.05.2011, accepted on 25.06.2011)

routine instillation of normal saline during endotracheal suctioning which has been a widespread practice in intensive care units. [3]

There are two system of suctioning, open and closed. Open-system suctioning, by definition, requires the patient to be disconnected completely from the ventilator circuit; therefore, oxygen, humidity and positive end expiratory pressure (PEEP) are not delivered during suctioning. Opening of the ventilator circuit leads to opportunity for contamination with pulmonary secretions to patient. But in closed-suctioning ventilator is not disconnected, therefore oxygen, humidity and PEEP are delivered during suctioning, also exposure to the patient's secretions is minimal. The closed suctioning allows hyperventilation and hyper oxygenation because the patient remains connected to the ventilator. Still evidence lacks in use of closed suction system prevent infection in intensive care unit. [2]

Earlier studies have been performed in closed suctioning system which had adverse effect on hemodynamic parameters. [4, 5, 6] One study on effect of saline instillation during open suctioning resulted in significant reduction in mixed venous oxygen saturation. [7]Two studies didn't describe the method of suctioning procedure. [8, 9, 10] Since open suctioning is commonly used in our intensive care unit, effect of saline instillation need to be studied. Study on saline instillation before tracheal suctioning on the incidence of ventilator associated pneumonia concluded that saline instillation group had decreased incidence of ventilator associated pneumonia. [11] Recent systematic review on efficacy and safety of normal saline instillation has concluded that there is little evidence of benefit and minimal evidence of safety risk. [12] There is conflicting literature regarding the usage of saline instillation during suctioning procedure. There is a need to further investigate the effect of saline instillation during suctioning procedure.

So aim of the study is to find effect of isotonic saline instillation on haemodynamic parameters such as oxygen saturation, heart rate, blood pressure and respiratory rate in mechanically ventilated patients with pulmonary infections.

MATERIALS AND METHODS

The study design was randomized controlled trial conducted at a tertiary care hospital. The total number of patients recruited for this study was 60 (30 in saline group and 30 in no saline group). Ethical committee clearance was obtained from the institutional ethical committee. Patients on mechanical ventilator with age greater than 18 years, diagnosed with pulmonary infection were included in the study. Pulmonary infection is defined as change in the amount, color and consistency of sputum ;growth of infectious organisms on sputum cultures; evidence of infiltrates on chest radiographs; a white blood cell count of 12000/mm^3 or less; and body temperature of 39°c or higher. [5]

Patients were excluded if they have unstable parameters (heart rate, blood pressure, respiratory rate, oxygen saturation). A written informed consent was taken from the patients, his or her proxy. The patients were selected as per the inclusion criteria. Patients were randomly assigned into two groups, saline group and no saline group using block randomization. Baseline characteristics such as age, gender and diagnosis were recorded. Further Murray Lung Injury score and clinical pulmonary infection score were recorded for severity of the disease. Baseline haemodynamic parameters such as oxygen saturation, heart rate, blood pressure, and respiratory rate of both saline group and no saline group were noted before suctioning procedure.

Pre-oxygenation by the delivery of 100% oxygen for at least 30 s prior to and after the suctioning procedure. Ambu of five breaths was used for hyper oxygenation before suctioning. In saline group, isotonic saline of approximately 5ml has been instilled before inserting suction catheter into the endotracheal tube. Suction pressure of 150mmHg for 15sec was used with intermittent ambu for 10 secs. This sequence was carried until the airway was clear as clinically indicated with minimal frequency.

Hemodynamic parameters (oxygen saturations, heart rate, blood pressure, and respiratory rate) , was noted at baseline , immediate and 1st , 2nd ,3rd ,4th ,5th ,10th ,15th and 30th minutes for both the groups.

RESULTS

The observation from the study were recorded and analized. Base line variables such as age, gender and diagnosis is demonstrated in table 1. Murray lung injury score and Clinical pulmonary infection score between saline and no saline group were analized using Mann-Whitney U test, which showed no significant difference between two group as shown in table 2 and 3 respectively. Comparison of heart rate ,respiratory rate, systolic blood pressure and diastolic blood pressure between two groups was performed at base line, immediate ,1st min,2nd,3rd,4th,5th,10th ,15th and 30th minutes with two way ANOVA is shown in table 4,5,6 and 7 respectively. It showed statistically insignificant difference ($P>0.05$). Figure 1,2,3,4 shows trends of change in haemodynamic measures between groups. Comparison of oxygen saturation between groups resulted in significant decrease in saline group compared to no saline group ($P<0.05$) as shown in table 8. Figure 5 shows trends in change between groups on oxygen saturation. Significant drop in oxygen saturation was observed from baseline 98.70 ± 1.95 to 2nd minute 94.80 ± 3.21 and it reached baseline at 30th minute 98.40 ± 1.58.

DISCUSSION

In this study instillation of saline has a

Table 1. Baseline characteristics

Characteristics		Saline	No saline
Age in years (Mean± SD)		55±17	55±13
Gender	Male	21	22
	Female	9	8
Diagnosis	ARDS	5	5
	COPD	6	5
	Asthma	3	0
	Congestive Cardiac Failure	2	4
	Abdominal surgery	3	4
	Cardiac surgery	1	0
	Thoracic surgery	1	0
	Head injury	0	2
	Stroke	4	7
	Renal failure	5	3

ARDS: Acute respiratory distress syndrome, COPD: Chronic obstructive pulmonary disease

Table 2. Murray lung injury score

		Mean± SD	T value	P value
Murray lung injury score	Saline	1.66±0.23	.620	.538
	No saline	1.70±0.27		

Table 3. Clinical pulmonary infection score

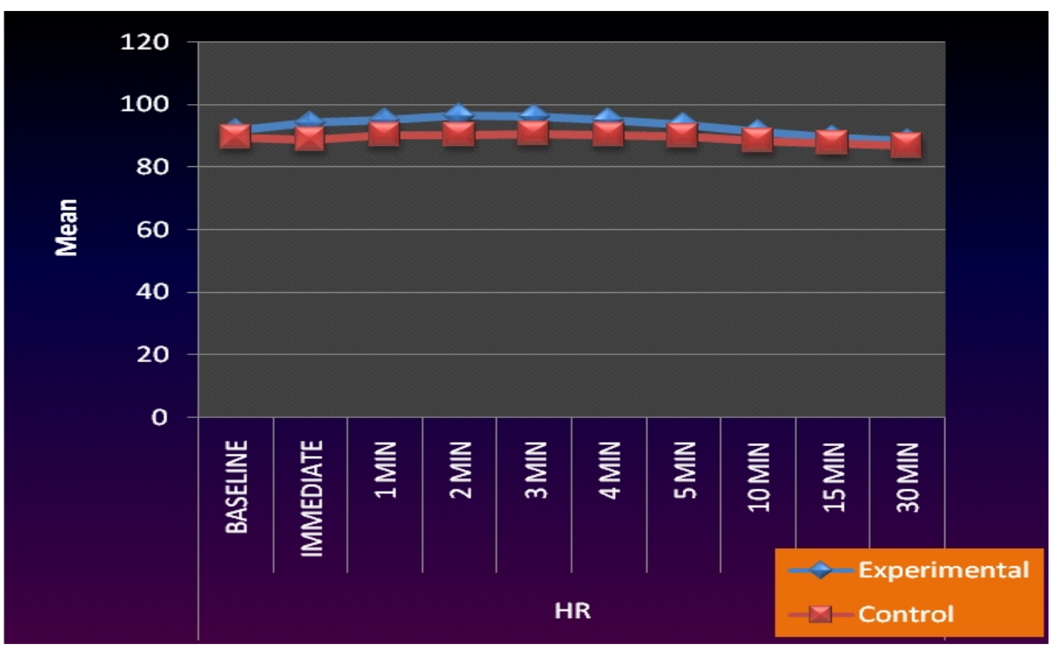
		Mean± SD	T value	P value
Clinical Pulmonary Infection Score	Saline	5.20±1.157	-1.010	.317
	No saline	4.93±.868		

Table 4: Between group comparison of heart rate (HR) for saline & no saline group

HR		BL	IM	1min	2min	3min	4min	5min	10min	15min	30min	F value	P value
Saline	Mean ± SD	91.73 ±14.58	94.13 ±13.14	95.13 ±13.14	96.47 ±13.64	96.27 ±12.75	95.10 ±11.31	93.53 ±12.03	91.30 ±11.83	89.40 ±11.94	88.43 ±12.17	1.814	0.063
No saline	Mean ± SD	89.50 ± 13.88	88.80± 11.19	90.43 ± 11.42	90.43 ±11.10	90.73 ±10.58	90.47 ±11.06	89.90 ±10.92	88.40 ±13.19	87.63 ±12.86	86.80 ±12.71		

$p<0.05$, BL - baseline, IM – immediate

Figure 1. Between group comparison of heart rate for saline & no saline group



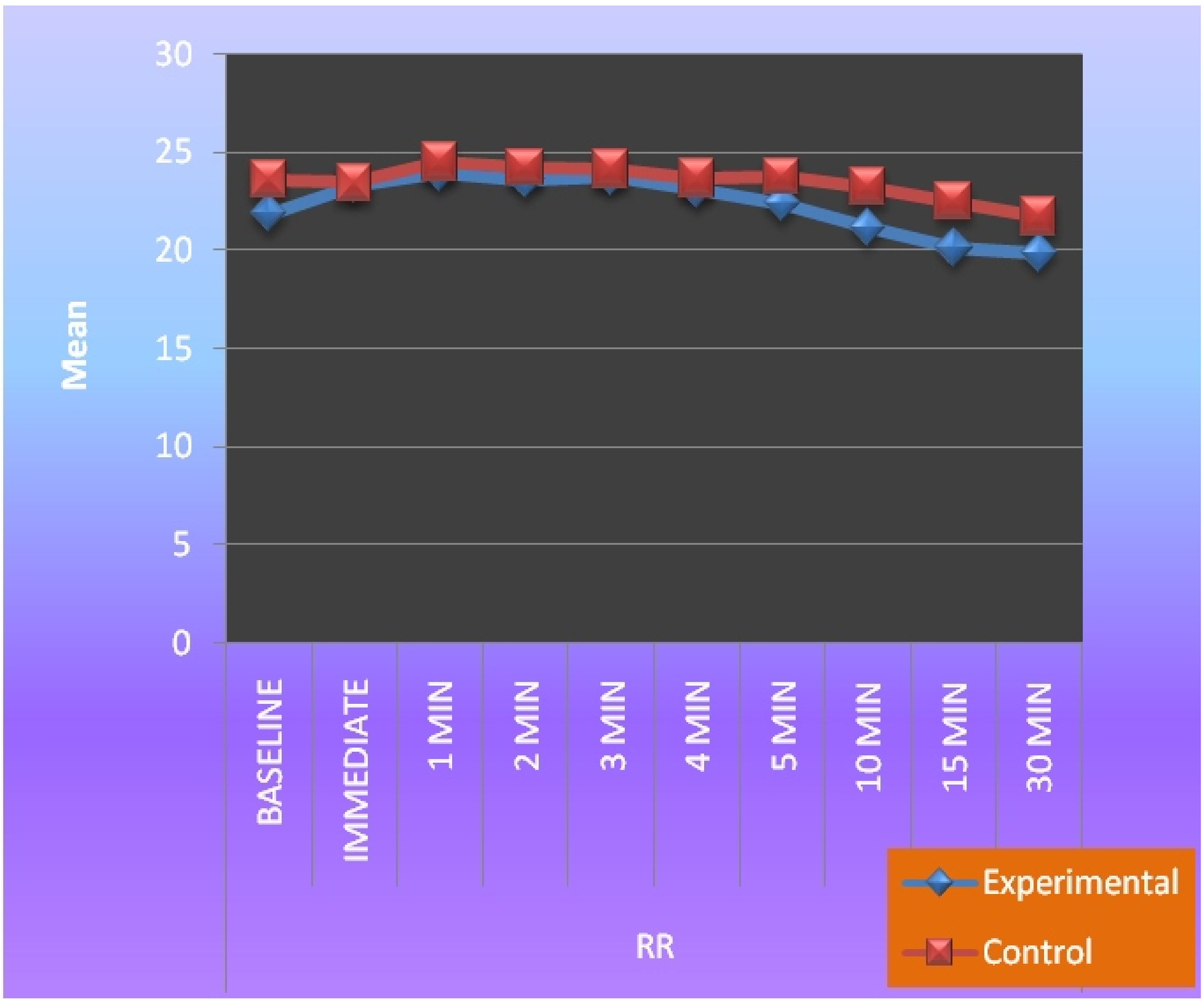
HR : Heart rate

Table 5. Between group comparison of respiratory rate (RR) for saline & no saline group

RR		BL	IM	1min	2min	3min	4min	5min	10min	15min	30min	F value	P value
Saline	Mean ± SD	21.87 ±5.07	23.33 ± 5.61	23.97 ±5.42	23.63 ±6.20	23.77 ±5.45	23.10 ±4.55	22.40 ±4.60	21.17 ±3.48	20.13 ±3.23	19.87 ±3.67	1.814	0.063
No saline	Mean ± SD	23.60 ±3.56	23.43 ±4.96	24.50 ±4.96	24.23 ±5.33	24.13 ±5.31	23.67 ±5.37	23.77 ±5.53	23.23 ±5.94	22.47 ±5.68	21.70 ±5.57		

p<0.05, BL - baseline, IM immediate

Figure 2. Between group comparison of respiratory rate for saline & no saline group



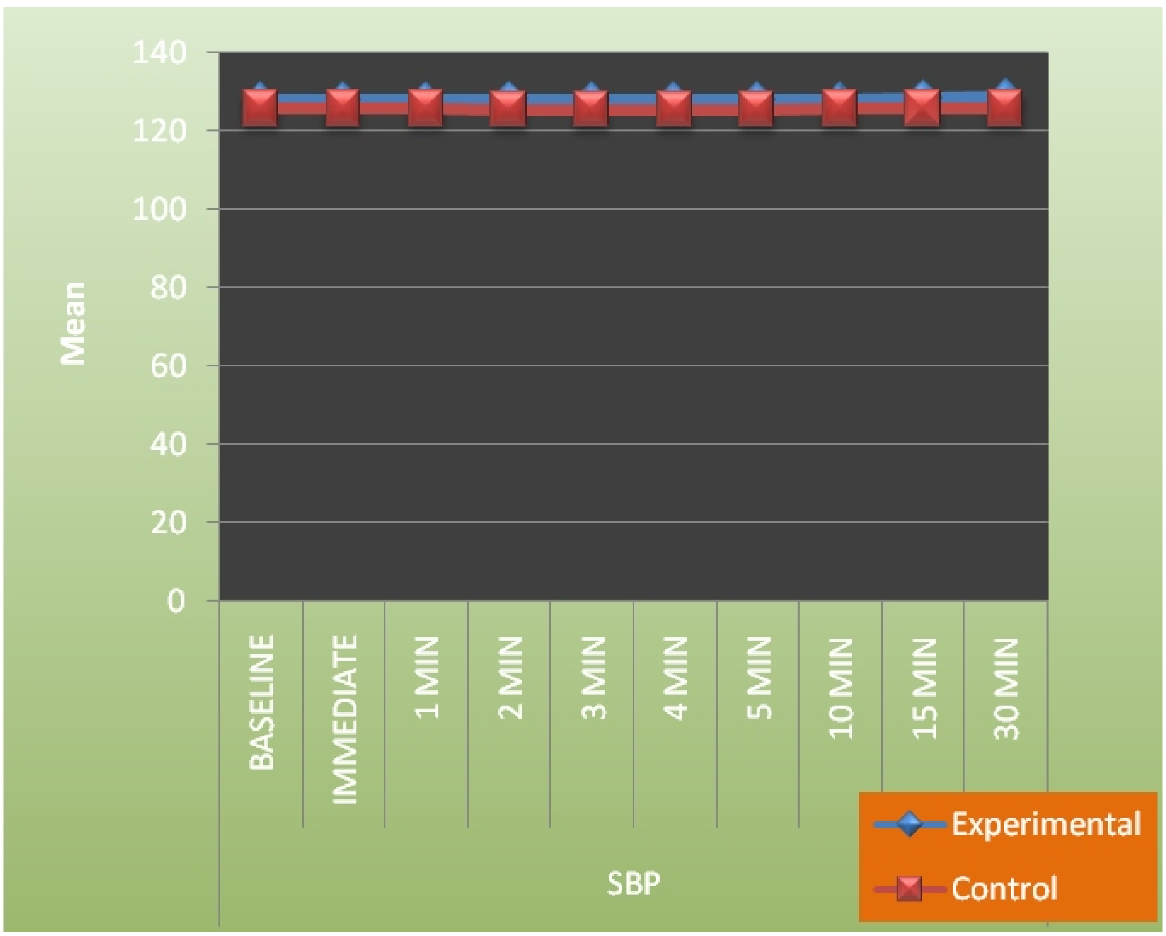
RR: Respiratory rate

Table 6. Between group comparison of systolic blood pressure (SBP) for saline & no saline group

SBP		BL	IM	1min	2min	3min	4min	5min	10min	15min	30min	F value	P value
Saline	Mean ± SD	128.00 ±12.97	129.00 ±13.72	129.23 ± 13.88	129.20 ± 13.78	128.80± 13.67	128.60± 12.97	128.45 ±12.90	128.40 ±12.90	128.33 ±12.88	128.67 ±12.79	0.611	0.788
No saline	Mean ± SD	125.67 ±13.04	126.83 ±13.25	126.80 ±13.20	126.78 ±13.33	125.90 ±13.02	125.85 ±13.30	125.70 ±13.62	125.67 ±13.09	125.67 ±13.99	125.67 ±13.39		

p<0.05, BL - baseline, IM immediate

Figure 3. Between group comparison of systolic blood pressure for saline & no saline group



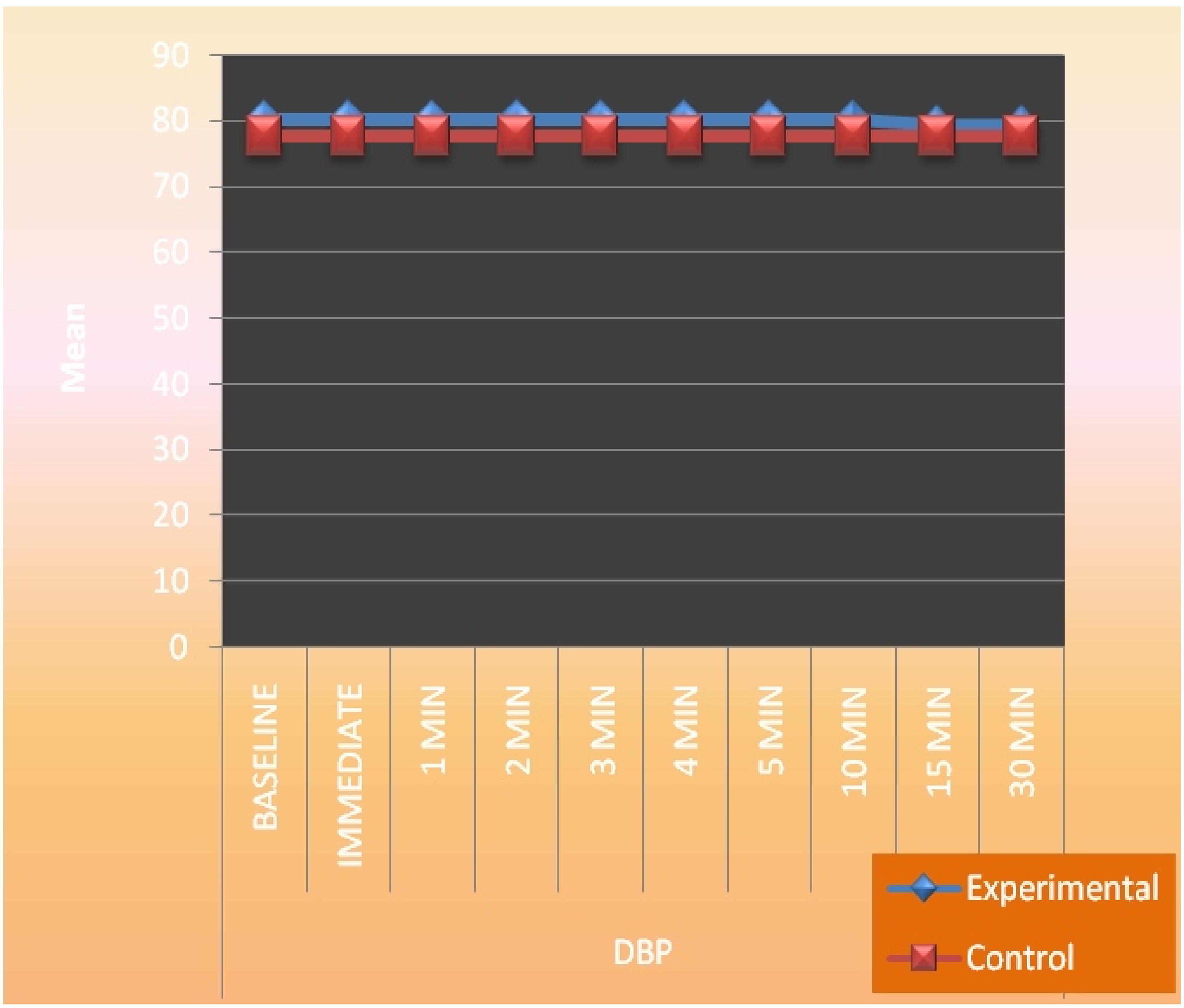
SBP: Systolic blood pressure

Table 7. Between group comparison of diastolic blood pressure (DBP) for saline & no saline group

DBP		BL	IM	1min	2min	3min	4min	5min	10min	15min	30min	F value	P value
Saline	Mean ± SD	80.33 ±7.18	81.70 ±7.84	81.67 ±7.77	81.56 ±7.81	81.58 ±7.56	80.79 ±7.44	80.58 ±7.10	80.17 ±7.84	79.33 ±6.97	79.33 ±6.39	1.715	0.61
No saline	Mean ± SD	77.67 ±8.17	78.67 ±8.92	78.55 ±8.72	78.70 ±8.01	78.38 ±8.19	78.67 ±8.14	77.67 ±8.03	77.55 ±8.38	77.38 ±8.72	77.25 ±8.28		

p<0.05, BL - baseline, IM immediate

Figure 4. Between group comparison of diastolic blood pressure for saline & no saline group



DBP : Diastolic blood pressure

Table 8. Between group comparison of oxygen saturation (OS) for saline & no saline group

OS		BL	IM	1min	2min	3min	4min	5min	10min	15min	30min	F value	P value
Saline	Mean ± SD	98.70 ±1.95	96.10 ±3.06	95.30 ±3.62	94.80 ±3.21	95.37 ±3.55	96.13 ±3.61	96.77 ±2.81	97.70 ±2.49	98.10 ±2.04	98.40 ±1.58	2.241	0.018 *
No saline	Mean ± SD	97.27 ±3.61	96.17 ±3.56	95.70 ±5.01	96.27 ±4.33	96.43 ±4.27	96.80 ±4.21	97.50 ±3.09	97.93 ±2.59	97.83 ±2.75	98.07 ±2.23		

* indicates p <0.05, BL - baseline, IM immediate

Figure 5. Between group comparison of oxygen saturation for saline & no saline group

SpO2: Saturated oxygen

detrimental effect on oxygen saturation. Study subjects comprised of patients with pulmonary infections who were incubated and receiving mechanical ventilation. The severity of lung disease was scored with Murray lung injury score which showed mild to moderate lung injury. The Clinical pulmonary infection score for both groups showed low to intermediate infection.

Heart rate was increased in saline instillation group, but it was statistically insignificant. The other parameters such as respiratory rate and blood pressure between the two groups were not significant.

Oxygen saturation decreased in both groups. However, oxygen saturation for the group who had instillation of normal saline decreased markedly following suctioning. Differences in oxygen saturation between the two groups were highly significant at 2nd, 3rd, and 5th minutes post suctioning. Saturation began to decrease at 1minute post suctioning and returned to baseline at 30minutes whereas without saline group reached the base line at 5minutes following suctioning. The reason for the adverse effect of oxygen saturation may be due to movement of the mucous to the periphery of the lung along with the saline. Instillation of saline was followed by manual hyperinflation. In these circumstances, the flow of air into the lungs is accelerated, which is likely to transports these secretions down the bronchial tree. As a result removal of secretions may be difficult with suction catheter. [5] This leads to accumulation of secretion in the lower airways and can interfere in gaseous exchange leading to drop in oxygen saturation. [13]

The extent of drop in saturation in this study was 3% from 98% to 95%. According to oxy hemoglobin curve, oxygen saturation is relatively stable above 80%. In this study, drop of 3% saturation within 90% to 100% of oxygen saturation may not be clinically significant. Still future studies are required to know the effect of saline instillation with oxygen saturation below 80%.

Earlier studies on hemodynamic changes in closed suction following saline instillation, concluded instillation of saline before suctioning had an adverse effect on oxygenation, [3, 5] but there was no change in heart rate, respiratory rate, and blood pressure. [5] In our study only 2ml of saline was instilled to 50% of the study population, since patients started coughing after saline instillation. The number of suctioning passes were not controlled since termination criteria was depended upon the clinical findings, once the airway was patent suction was stopped for all the subjects.

CONCLUSION

The present study concludes instillation of saline for secretion removal to be used judicially as it leads to decreased oxygen saturation.

REFERENCES

1. Wilkins RL, Stoller JK, Scanlan CL. Egan's fundamental of respiratory care. 8th ed. Mosby. 452-467, 653-701.
2. Hooser D. Airway clearance with closed system suctioning. American association of critical care nurses. 2002; 1-11.
3. Ridling DA, Martin LD, Bratton SL. Endotracheal suctioning with or without instillation of isotonic sodium chloride solution in critically ill children. *Am J Crit Care.* 2003; 12: 212-219.
4. Ackerman MH. The effect of saline lavage prior to suctioning. *Am J Crit Care.* 1993; 2: 326-330.
5. Ackerman MH, Mick DJ. Instillation of normal saline before suctioning in patients with pulmonary infections: a prospective randomized controlled trial. *Am J Critical Care.* 1998; 7: 261-266.
6. O'Neal PV, Grap MJ, Thompson C, Dudley W. Level of dyspnoea experienced in mechanically ventilated adults with and without saline instillation prior to endotracheal suctioning. Intens Crit Care Nurs. 2001; 17: 356-63.
7. Walsh JM, Vanderwarf C, Hoscheit D, Fahey PJ.

Unsuspected hemodynamic alterations during endotracheal suctioning. Chest. 1989; 95: 162-165.

8. Akgul S, Akyolcu N. Effects of normal saline on endotracheal suctioning J Clin Nurs. 2002;.11: 826-30.

9. Kinloch D. Instillation of normal saline during endotracheal suctioning; effects on mixed venous oxygen saturation. *Am J Critical Care.* 1999; 8: 231-240.

10. Ji YR, Kim HS, Park JH. Instillation of normal saline before suctioning in patients with pneumonia. Yonsei medical journals. 2002; 43: 607-612.

11. Caruso P, Denari S, Ruiz SA, Demarzo SE, Deheinzelin D. Saline instillation before tracheal suctioning decreases the incidence of ventilator associated pneumonia. Crit Care Med. 2009; 37: 32-8.

12. Paratz JD, Stockton KA. Efficacy and safety of normal saline instillation: A systematic review. Physiotherapy. 2009; 95: 241-250.

13. Hagler DA, Traver GA. Endotracheal saline and suction catheters: sources of lower airway contamination. *Am J Crit Care.* 1994; 3: 444-447.

Physiotherapy and Occupational Therapy Journal
Volume 4 Number 1, January - March 2011

Craniosacral Therapy

Abha Sachdev
Nidhi Kashyap
Savita Tamaria

ABSTRACT

Craniosacral therapy (CST) is a non-pharmacological approach which is used to treat a wide variety of disorders such as neck and back pain, migraines, mental stress, TMJ Syndrome, chronic pain conditions such as fibromyalgia, etc.. It involves manually identifying restrictions in the craniosacral system and using soft, gentle hands-on techniques to correct it. It helps in easing out the restrictions of nerve passages, optimizing movement of the cerebrospinal fluid through the spinal cord and restoring proper position of the misaligned bones. Although being a useful therapy, it has a lot of criticisms and little scientific support for the underlying theoretical model.

Keywords Craniosacral Therapy, Cranial Rhythm.

INTRODUCTION

Craniosacral therapy (CST) involves manually identifying restrictions in the craniosacral system which includes the bones, membranes and cerebrospinal fluid (CSF) that surround the brain and spinal cord, and using soft, gentle hands-on techniques to both normalize the cerebrospinal fluid rhythm and correct restrictions in perispinal tissues and fascia.[1] Manual palpation and manipulation of this system theoretically affects sensory, motor, cognitive and emotional processes in the nervous system. It is purported to reduce the use of conventional pain medications and improve daily functioning in a variety of conditions.[1]

In the early 1900s, Dr. William Sutherland concluded that skull bones are not firmly fixed but can move relative to each other. With these observations, he developed cranial osteopathy. In recent years, Dr. John Upledger further developed Sutherland's observations and incorporated them into a treatment regime called craniosacral therapy.

According to the osteopathic literature, craniosacral therapy (CST) is based on five physiological premises: 1) motility of the central nervous system, 2) rhythmic fluctuation of the cerebrospinal fluid, 3) mobility of the 22 bones of the skull, 4) mobility and continuity of the meninges between the cranium and sacrum, and 5) continuity of the meninges with the connective tissues (fasciae) of the rest of the body. The goal of CST is to effect somatic and visceral bodily changes by using these cranial bone-meningeal-fascial connections, viewing the patient as an

Author's Affilation: Lecturer, Banarsidas Chandiwala Institute of Physiotherapy, Chandiwala Estate, Maa Anandmai Marg, Kalkaji, New Delhi

Reprinht's request: Dr. Abha Sachdev, Banarsidas Chandiwala Institute of Physiotherapy, Chandiwala Estate, Maa Anandmai Marg, Kalkaji, New Delhi.

(Received on 05.04.2011, Accepted on 24.05.2011)

"integrated totality."[2]

BASIS OF CRANIOSACRAL THERAPY

The craniosacral system consists of the three layered membrane system (the meninges viz. Dura mater, arachnoid membrane & pia mater), the enclosed cerebrospinal fluid, the physiological structures that control fluid input and outflow, and related bones. It is a semi-enclosed biological hydraulic system encompassing the brain and spinal cord. Within the system, the cerebrospinal fluid rhythmically pulses at a rate of about ten cycles per minute. This is called the Craniosacral Rhythm or the Cranial Wave. This is independent of heart or respiratory rhythms.

It is suggested that the skull bones must be slightly moving continuously to accommodate the fluid pressure changes within this semi-closed hydraulic system.[3] The craniosacral system's fluid barrier is the dura mater, which also composes the skull's inside lining. The membrane barrier is also attached to the upper neck vertebrae, the lower back sacrum, the tailbone, and the openings in the spinal column. Any restriction that interferes with the membrane's ability to accommodate the rhythmically fluctuating fluid pressures and volumes is a potential problem.

Craniosacral therapy's object is to find areas of restricted movement that compromise function and re-establish normal movement. Because the craniosacral system encloses the brain and spinal cord, it influences the entire nervous system, affecting many body functions.[4]

Upledger & Vredevoogd gave a “pressurestat model” to explain the events within the Craniosacral system. They suggested presence of nerve plexuses along with a variety of receptors in the sagittal suture that would sense both compression and stretch of the intrasutural material. The intrasutural stretch receptors signal the choroid plexuses to shut down production of CSF when the suture is expanded. Sutural expansion results from an increased volume/pressure of CSF within the meningeal compartment. Because CSF is continually being reabsorbed into the venous system during the shutdown, CSF volume is gradually reduced and cranial vault stretch receptors are deactivated. As CSF volume further reduces, intrasutural compression receptors are activated and signal the choroid plexuses to resume CSF production. As the fluid compartment refills, the cycle repeats.[4]

THE PROTOCOL

A ten-step protocol for Craniosacral Therapy serves as a general guideline, which includes (1) analyzing the base (existing) cranial rhythm, (2) creating a still point in that rhythm at the base of the skull, (3) rocking the sacrum, (4) lengthening the spine in the lumbar-sacral region, (5) addressing the pelvic, respiratory and thoracic diaphragms, (6) releasing the hyoid bone in the throat, and (7-10) addressing each one of the cranial bones. The practitioner may use discretion in using which steps are suitable for each client, and may or may not follow them in sequential order, with time restraints and the extent of trauma being factors.

Patients often report a sense of deep relaxation during and after the treatment session, and may feel light-headed. This is popularly associated with increases in endorphins, but research shows the effects may actually be brought about by the endocannabinoid system.

BENEFITS

It has been reported that CST could be effective in the treatment of fibromyalgia,[5,6] autism, headache, temporomandibular joint dysfunctions, asthma,[7] chronic sinus infections, vertigo,[8] chronic fatigue syndrome, gastroenteritis, dyslexia, depression, etc..[2]

Harrison RE et al reviewed the records of 157 patients treated with Craniosacral Therapy (CST). They found that 74% of patients reported a valuable improvement in their presenting problem. Outcome by diagnostic groups suggested that CST is particularly effective for patients with headaches and migraine, neck and back pain, anxiety and depression. 70% of patients on medication decreased or discontinued it, and patients' average general practitioner consultation rate fell by 60% in the 6 months following treatment.[9]

CRITICISMS

There are extensive criticisms of craniosacral therapy from the scientific and health care professionals as to the validity and efficacy of Cranial Type techniques and principles. The following criticisms are cited against this form of therapy:

1. Lack of evidence for the existence of "cranial bone movement": Scientific evidence does not support the theories for cranial bone movement. Researches documented in the literature have shown that partial fusion between cranial bones occurs during growth and development.[10,13]

2. Lack of evidence for the existence of the "cranial rhythm": While evidence exists for cerebrospinal fluid pulsation, but it may be also be hypothesized that the cranial rhythm is caused by the functioning of the cardiovascular system and not by the workings of the craniosacral system.[13]

3. Lack of evidence linking "cranial rhythm" to disease: Research to date to support the link between the "cranial rhythm" and general health is cited as "low grade" and "unacceptable to meet scientific measures".

4. Lack of evidence that "cranial rhythm" is detectable by practitioners: Operator interreliability has been very poor in studies that have been done.[11,12]

REFERENCES

1. John D Mann, Keturah R Faurot, Laurel Wilkinson, Peter Curtis, Remy R Coeytaux, Chirayath Suchindran and Susan A Gaylord. Craniosacral therapy for migraine: Protocol development for an exploratory controlled clinical trial. BMC Complementary and Alternative Medicine. 2008; 8: 28.
2. Sandra L. Ehrett. Craniosacral Therapy and Myofascial Release in Entry-level Physical Therapy Curricula. Physical Therapy Volume 68, Number 4, April 1988
3. John Upledger. Craniosacral Therapy and Scientific Research, Part I *Massage Today* October. 2003; 03*(*10*).*
4. Virginia Wirth-Pattullo, Karen W Hayes. Craniosacral Therapy. Physical Therapy. 1995; 75(4).
5. Guillermo A. Matara´ n-Pen˜ arrocha1, Adelaida Marı´a Castro-Sa´ nchez, Gloria Carballo Garcı´a, Carmen Moreno-Lorenzo, Tesifo´ n Parro´ n Carren˜ o and Marı´a Dolores Onieva Zafra. Influence of Craniosacral Therapy on Anxiety, Depression and Quality of Life in Patients with Fibromyalgia Evid Based Complement Alternat Med. 2009.
6. Castro-Sánchez AM, Matarán-Peñarrocha GA, Sánchez-Labraca N, Quesada-Rubio JM, Granero-Molina J, Moreno-Lorenzo C. A randomized controlled trial investigating the effects of craniosacral therapy on pain and heart rate variability in fibromyalgia patients. Clin Rehabil. 2011; 25(1): 25-35. Epub 2010 Aug 11.
7. Mehl-Madrona L, Kligler B, Silverman S, Lynton H, Merrell W. The impact of acupuncture and craniosacral therapy interventions on clinical outcomes in adults with asthma. Explore (NY). 2007; 3(1): 28-36.
8. Christine DC. Temporal bone misalignment and motion asymmetry as a cause of vertigo: the craniosacral model. Altern Ther Health Med. 2009; 15(6): 38-42.
9. Harrison RE, Page JS. Multipractitioner Upledger CranioSacral Therapy: descriptive outcome study 2007-2008. J Altern Complement Med. 2011; 17(1): 13-7. Epub 2011 Jan 9.
10. Madeline LA, Elster AD. Suture closure in the human chondrocranium: CT assessment. Radiology. 1995; 196(3): 747-756.
11. Wirth-Pattullo V, Hayes KW. Interrater reliability of craniosacral rate measurements and their relationship with subjects' and examiners' heart and respiratory rate measurements. Physical Therapy. 1994; 74(10): 908-16, discussion 917-20.
12. JS Rogers, PL Witt, MT Gross, JD Hacke, and PA Genova. "Simultaneous palpation of the craniosacral rate at the head and feet: intrarater and interrater reliability and rate comparisons" Physical Therapy. 1998; 78(11): 1175-1185.
13. Steve E Hartman, James M Norton Craniosacral Therapy Is Not Medicine Physical Therapy, November 2002; 82*(*11*):* 1146-1147.

BOOKS FOR SALE

Physiotherapy and Occupational Therapy Journal
Volume 4 Number 1, January - March 2011

Sitting postural control is prerequisite for standing and stepping after stroke: A cross-sectional study

Akshatha Nayak, MPT *
S Karthikbabu, MPT, (PhD)**
K Vijayakumar, MPT, (PhD)**
Sailakshmi Ganesan , MSc (PT), PhD***
M Chakrapani, MD****
V Prem, MPT, (PhD)*****

ABSTRACT

Objective: To examine the trunk performance during static and dynamic sitting postural control, and to find an association with functional balance such as standing and stepping early after stroke., Participants and setting: Fifty-nine stroke patients (range 2-45 days) were evaluated once for trunk performance and functional balance by same observer in an in-patient stroke rehabilitation centre, Kasturba Medical College Hospital, Mangalore, Manipal University., **Measures:** Trunk Impairment Scale (TIS) and its subscales; Brunel Balance Assessment (BBA) and its sub-sections., **Results:** Stroke participants had a mean (SD) score of 14.5 (3.8) and 7 (3) on TIS and BBA. The Karl Pearson Correlation Coefficients was used to compare the association of TIS and its subscales, with BBA and standing, stepping measures, and found to be moderate and high correlation among the measures. The correlation was significant at the level of R value > 0.6 (P< 0.01)., Conclusion: Static and dynamic sitting postural control is affected in stroke patients as a result of poor selective trunk muscle control. In addition, trunk performance in sitting influences the balance performance in standing and stepping early after stroke.

Key Words: Stroke, Postural Control, Trunk Performance, Balance

INTRODUCTION

In India, the prevalence of stroke is estimated to be 203 per 100,000 populations, accounting to a total of about one million cases. It ranked as the sixth leading cause of disability in 1990 and is projected to rank fourth by 2020. Amongst the non-communicable diseases, stroke contributes for 41 percent of deaths and 72 percent of disability adjusted life years as estimated by Indian Council of Medical Research.[1-3] Following stroke, patients suffer from severe postural unsteadiness, and tend to have frequent numbers of falls, as well as greater restriction of activities after fall.[4] Reports stated that only approximately 20-66% of patients with stroke manage to walk independently in the community again.[5] The sensory and motor impairments of upper limb, lower limb and trunk interfere with the functional performance after stroke. Trunk performance has been identified as an important early predictor of functional outcome after stroke.[6-8] Unlike hemiplegic limb muscles, the trunk muscles are impaired on both sides of the body following an unilateral stroke as evaluated by computed tomography and motor evoked potential studies.[9-10]

Author's Affiliation: *Post- graduate, Department of Physiotherapy, **Associate Professor, Department of Physiotherapy, ***Professor, Department of Physiotherapy, ****Professor in Medicine, Director, Kasturba Medical College Clinical Research Centre, Manipal University, *****Associate Professor, Manipal College of Allied Health Sciences, Bangalore, Manipal University, India.

Reprints Requests: S Karthikbabu, MPT, Assistant Professor, Department of Physiotherapy, Kasturba Medical College, Mangalore, (A constituent Institute of Manipal University), Karnataka. Email: karthikbabu78@gmail.com.

(Received on 30.01.2011, accepted on 14.06.2011)

Studies on handheld and isokinetic dynamometer muscle strength testing found that trunk muscles are weak in patients with stroke, when compared to that of age matched healthy controls.[11-14] Movement analysis of trunk also found that selective trunk muscle control, particularly the lower trunk muscle activity was minimal in patients with stroke.[15] The primary contribution of the trunk muscles is to allow the body to remain upright, adjust weight shift, and performs selective movements of the trunk against constant pull of gravity. Hence, it helps to maintain the center of mass within the base of support during static and dynamic postural adjustments in sitting, standing and stepping.[16,17] A study on electromyography analysis found an impaired anticipatory postural trunk muscles activity in patients with stroke, which in turn essential for static postural control.[18] Furthermore, studies on posturographic analysis found an impaired dynamic postural control in patients with stroke during sitting[19] and standing.[20] Amongst the clinical measurement tools available to measure trunk performance,[21-23] the Trunk Impairment Scale (TIS) evaluates the selective movement control of the upper and the lower trunk in patients with stroke. Verheyden et al identified an impaired trunk performance in patients with non-acute and chronic stroke.[24] Recently, a clinical measurement tool, Brunel Balance Assessment was available to evaluate the standing and stepping in patients early after stroke.[25-27] Recent cross sectional study demonstrated that trunk performance i.e. sitting postural control was related to measures of balance and mobility in patients with non-acute and chronic stoke.[28] To the best of our knowledge, there are no retrievable data available to evaluate the trunk performance in sitting for patients with less than 45 days post-stroke duration. In addition, this study also sought to correlate the trunk performance (static and dynamic postural control in sitting) with the measures of functional balance such as standing and stepping early after stroke.

METHODS

This study protocol was approved by the Ethics and Scientific Committee of the Institution, Manipal University, India. The study participants were recruited from the neurological rehabilitation centre of the inpatient stroke unit, Kasturba Medical College Hospital, Mangalore, and written informed consent was obtained seeking their active participation. Acute stroke patients with medical stability; ability to understand and follow simple verbal instructions were screened for eligibility for the study. Stroke diagnosis was confirmed by the CT and MRI imaging. Patients (mean (SD) 19±10 (range 2-45) days) with the single onset of unilateral supra tentorial ischemic or hemorrhagic stroke lesion; and independent static sitting ability for 30 seconds on a plinth, were included in the study. Patients were excluded if they had other neurological and/or orthopedic disorders that could influence sitting balance.

Measures

The Trunk Impairment Scale (TIS) was used to measure trunk performance in sitting. It has three subscales consisting of static sitting balance, dynamic sitting balance and coordination. It comprises of 17 items and each item of TIS is scored on a 2-, 3-, or 4-point ordinal scale. The maximum scores for static sitting balance, dynamic sitting balance and coordination are 7, 10 and 6 respectively. The total score ranges from minimum 0 to maximum 23 points, a higher score indicating a better performance. Static sitting balance subscale of TIS in fact measures the static postural control while both the dynamic sitting balance and coordination subscales of TIS measure the dynamic postural control. Dynamic sitting balance evaluates the dynamic postural control in coronal plane, measuring the trunk lateral flexor muscle control. Coordination evaluates the dynamic postural control in transverse plane, measuring the trunk rotator muscle control. In earlier studies TIS had been documented for its reliability, validity and responsiveness.[23,24]

The Brunel Balance Assessment (BBA) was used to measure the functional balance performance of the stroke participants. It consists of a hierarchical series of functional performance tests that ranges from supported sitting balance to advanced stepping tasks. There are three sections to the assessment: sitting, standing and stepping. The sections are divided into several levels each of which increase the demand on balance ability, ranging from assisted balance to moving within the base of support, and changes of the base of support. Standing section of BBA evaluates the static and dynamic postural control without changing the base of support. Stepping section of BBA evaluates the static and dynamic postural control while attaining new base of support. BBA combines a 12-point ordinal scale and found to be reliable, valid measure of balance disability after stroke.[25-27] The study participants were evaluated once by same observer, and the coin toss method was used to prefer the sequence of the measures.

DATA ANALYSIS

Descriptive measures are summarized as mean SD or percentage, as mentioned. The Karl Pearson Correlation Coefficient was used to compare the association of TIS and its subscales, with BBA and standing, stepping measures. An R value between 0.26 and 0.49 is considered as low correlation. An R value between 0.5 and 0.69 is considered to be moderate correlation. An R value between 0.7 and 0.89 is considered to be high correlation, while value beyond 0.9 is with very high correlation.[29] The correlation was significant at the level of $P<0.01$. The analysis was performed using the SPSS version 11.5.

RESULTS

Among the fifty-nine study participants, 34 were males and 25 were females. Participants' age and post-stroke duration were 57 ± 9 (range 40-75) years and 19 ± 10 (range 2-45) days, respectively. Thirty eight participants were left sided stroke and 21 were right sided stroke. Table 1 shows values of participants' measures. Table 2 shows the correlation among the measures.

There were no participants attained the maximum score in the total TIS. Earlier study also identified that the total TIS score above 21 is considered to be the normal trunk performance in sub-acute and chronic stroke patients.[24] Thirty-five participants attained maximum score in dynamic standing. Sixteen participants attained dynamic standing while six participants were able to stand with support. Twenty-nine participants scored zero while six participants attained the maximum score in stepping component of BBA. Two participants were able to maintain stride stance and nine participants could transfer weight on and off the weak leg while in stride-standing position. Four participants were able to walk with walking aid, and six were able to walk without a walking aid. Three participants were able to step on a box while balancing on involved lower limb.

DISCUSSION

The aim of this study was to examine the trunk performance in sitting for patients with less than 45 days since stroke onset. Furthermore, the study intended to examine the trunk movement control and its association with standing and stepping. Our study results found that trunk performance as measured by TIS and its subscales were positively associated with functional balance performance as measured by BBA and its subscales (Figure 1 and 2).

Rationale for the selection of TIS to measure the sitting postural control is given below. Availability of objective tools to evaluate trunk function in patients with stroke is present, and documented in literature elsewhere.[9-15] There are only limited clinical measurement tools available to measure trunk performance in stroke patients. Earlier studies addressed that Trunk Control Test (TCT) and trunk control items of Postural Assessment Scale are good tools in measuring trunk performance since they have high sensitivity and no flooring effect in early stage stroke.[7,21] But, these tools usually measure the gross bed mobility such as rolling over towards affected and unaffected side in lying and static sitting postural control. The above mentioned tools may be deficient in measuring selective trunk movement control which is essential for dynamic sitting postural control. A clinical measurement tool, Trunk Impairment Scale (TIS), found to be sensitive tool in measuring trunk performance in non-acute and late stage stroke.[24] This scale may be applicable to examine the trunk lateral flexor and rotator muscles control in early stage stroke patients with static sitting postural control.

Rationale for the selection of BBA to measure standing and stepping is given below. There are clinical measurement tools available to measure the postural control in standing and mobility for non-acute and chronic stage stroke patients.[30-33] Recently, a clinical measurement tool, Brunel Balance Assessment (BBA) is available to measure postural control in sitting, standing and stepping. Standing subcomponent of BBA measures the static and dynamic postural control in standing. Stepping component of BBA measure the advance level of postural control, where the center of mass is maintained in the changing base of support.[25-27] The advantage of BBA is the hierarchical series of postural control measurement, thus it may be applicable to measure the postural control in standing and stepping for the early phase stroke patients who had already attained independent sittingability.

This study showed that static sitting postural control had moderate and high correlation with standing and stepping, respectively. In static sitting balance, the ability to maintain the trunk alignment was assessed. Anticipatory trunk muscle activity is necessary to attain the static postural stability in sitting position, and had the positive relationship with motor and functional impairments in stroke patients.[18] This study also found that lateral flexor muscle control had high correlation with functional balance performance. In addition, lateral flexor muscle control had moderate and high correlation with standing and stepping, respectively (Figure 3 and 4). In dynamic sitting balance, trunk lateral flexor muscle control was evaluated in coronal plane. Study on hand-held dynamometer strength testing also identified lower scores in measuring the similar trunk movement in stroke patients.[11] Trunk lateral flexor muscle control is essential for shifting the body weight within the limits of stability in coronal plane. A recent study also identified that stroke patients tend to avoid shifting their weight towards hemiplegic side in sitting[19] and standing.[20] Weight shifting ability towards hemiplegic side requires trunk muscles control alone in sitting, but both the trunk lateral flexor and hip abductor muscles control are essential in standing. In order to attain postural control in standing and stepping, both the hemiplegic lower limb and trunk muscles control to be present. According to neuro-developmental principles, if better the trunk performance is attained, better the limb control may be anticipated.

Furthermore, the study also found that trunk rotator muscle control had high correlation with functional balance performance, and moderate and high correlation with standing and stepping components of BBA, respectively (Figure 5 and 6). For the coordination subscale of TIS, the trunk rotation movement i.e. trunk rotator muscle control was evaluated in transverse plane. Study on isokinetic dynamometer strength testing also identified lower scores in measuring the similar trunk movement in stroke patients.[14] Rotation and counter-rotation between upper and lower trunk is believed to be important after stroke since all the functional movements are initiated by either upper trunk or lower trunk. Bio-mechanically, the lower trunk muscles chiefly the rotators, and hip extensors are the force couple that gets activated together during dynamic standing and stepping. For stepping component of BBA such as walking with or without a walking aid, lower trunk rotation muscles are essential to maintain the pelvis. Studies also identified that the pelvic control is unstable in stroke patients.[34] In this study, combination of dynamic sitting balance and coordination subscales of TIS was considered as dynamic sitting postural control since both of them evaluate the coronal and transverse planar weight shift ability of the trunk in sitting. Dynamic sitting postural control had high correlation with functional balance performance particularly of both standing and stepping (Figure 7 and 8).

Table 1: Descriptive values of 59 participants

Measures	Range	Mean (SD)	Percentage %
Trunk Impairment Scale (TIS) (0-23)	5-21	14.53 (3.79)	63 (16)
Static sitting balance(SSB) (0-7)[a]	5-7	6.28 (0.8)	90 (11)
Dynamic sitting balance (DSB) (0-10)[b]	0-9	5.8 (2.1)	58 (21)
Coordination (0-6)[c]	0-5	2.47 (1.26)	41 (21)
DSB + Coordination (0-16)[d]	0-14	8.27 (3.25)	52 (20)
Brunel Balance Assessment (BBA) (0-12)	3-12	7.08 (2.95)	59 (25)
Standing (0-3)	0-3	2.21 (1.01)	74 (34)
Stepping (0-6)	0-6	1.87 (2.17)	31 (36)

[a] Static postural control; [b] Trunk lateral flexor muscle control; [c] Trunk rotator muscle control; [d] Dynamic postural control in coronal and transverse plane

.Table 2: Results of Carl Pearson, Correlation Coeffic Ients. Values are given as R (P value)

Test	TIS-total[a]	SSB[b]	DSB[c]	Coordination[d]	DSB + Coord[e]
BBA-total[f]	0.857(<0.0001)	0.712(<0.0001)	0.851(<0.0001)	0.804(<0.0001)	0.862(<0.0001)
Standing	0.721(<0.0001)	0.570(<0.001)	0.689(<0.0001)	0.674(<0.0001)	0.710(<0.0001)
Stepping	0.831(<0.0001)	0.703(<0.0001)	0.813(<0.0001)	0.797(<0.0001)	0.837(<0.0001)

TIS-total[a] (Trunk Impairment Scale- total score); SSB[b] (Static Sitting Balance/Static postural control); DSB[c] (Dynamic Sitting Balance/Trunk lateral flexor muscle control); Coordination[d] (Trunk rotator muscle control); DSB+Coord[e] (Dynamic postural control in coronal and transverse plane). Correlation is significant at the 0.01 level.

Figure 1: Correlation between Trunk Impairment Scale (TIS) and Brunel Balance Assessment (BBA)

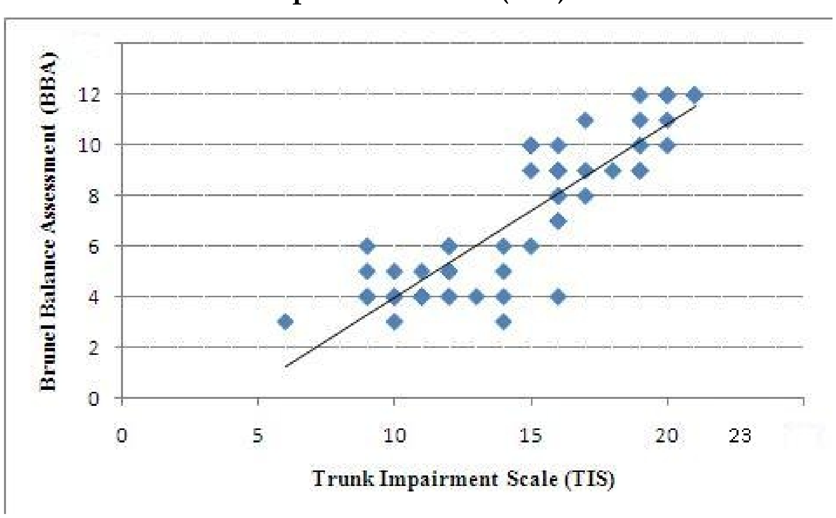


Figure 2: Correlation between Trunk Impairment Scale (TIS) and stepping component of BBA

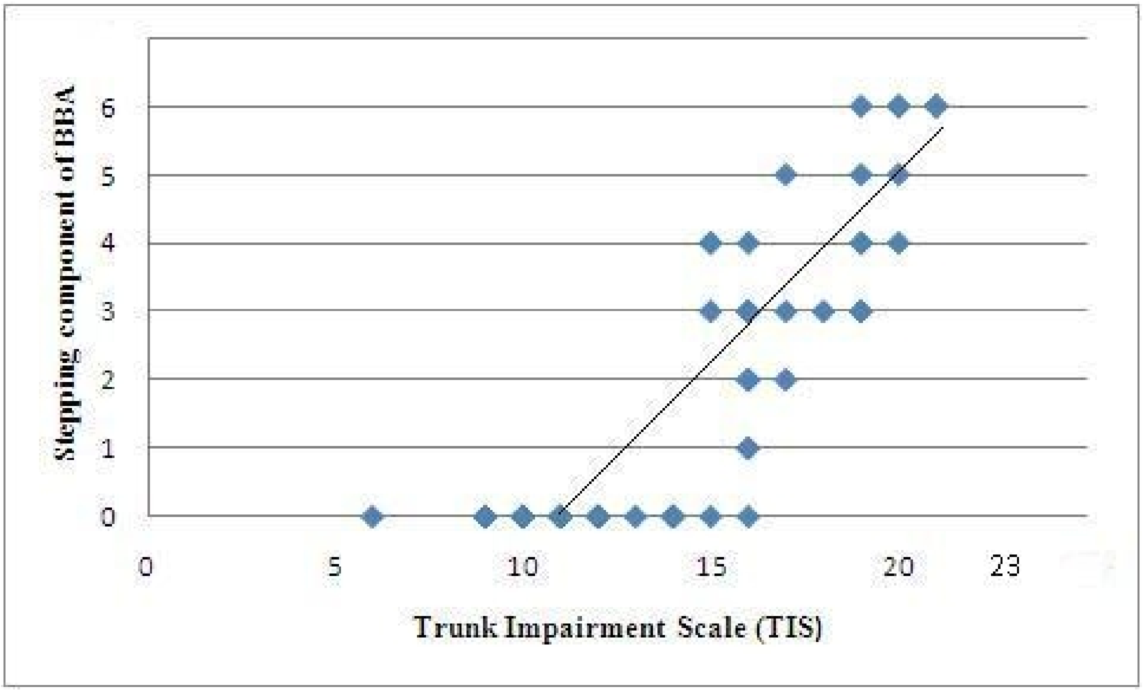


Figure 3: Correlation between trunk lateral flexion control and BBA

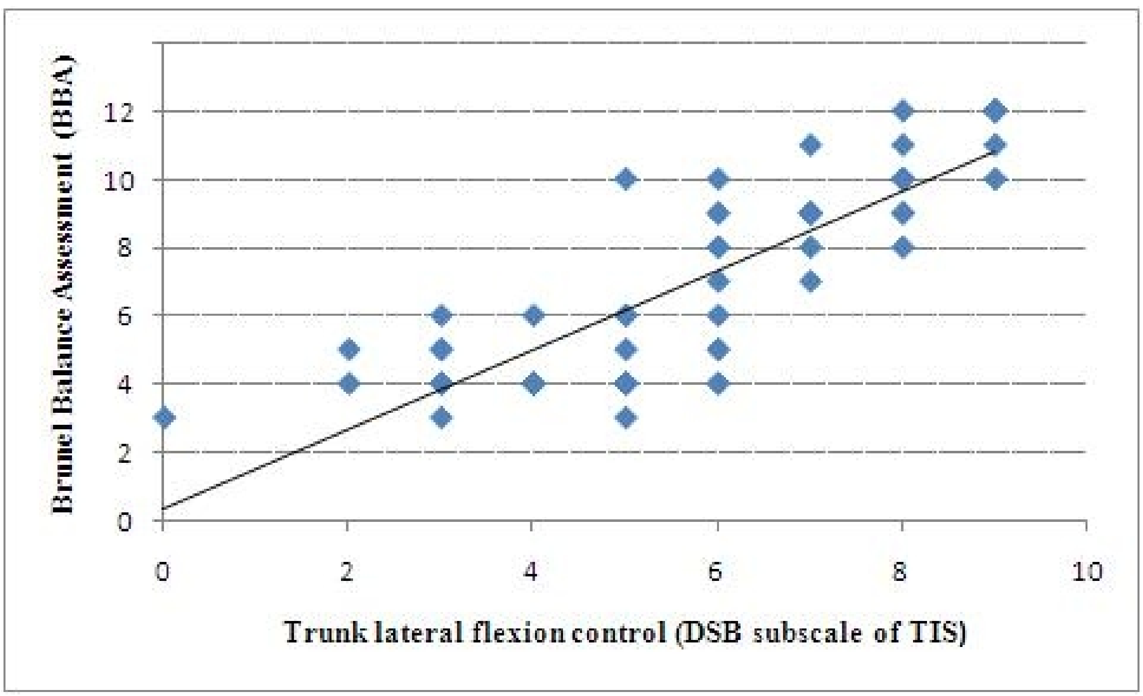


Figure 4: Correlation between trunk lateral flexion control and stepping component of BBA

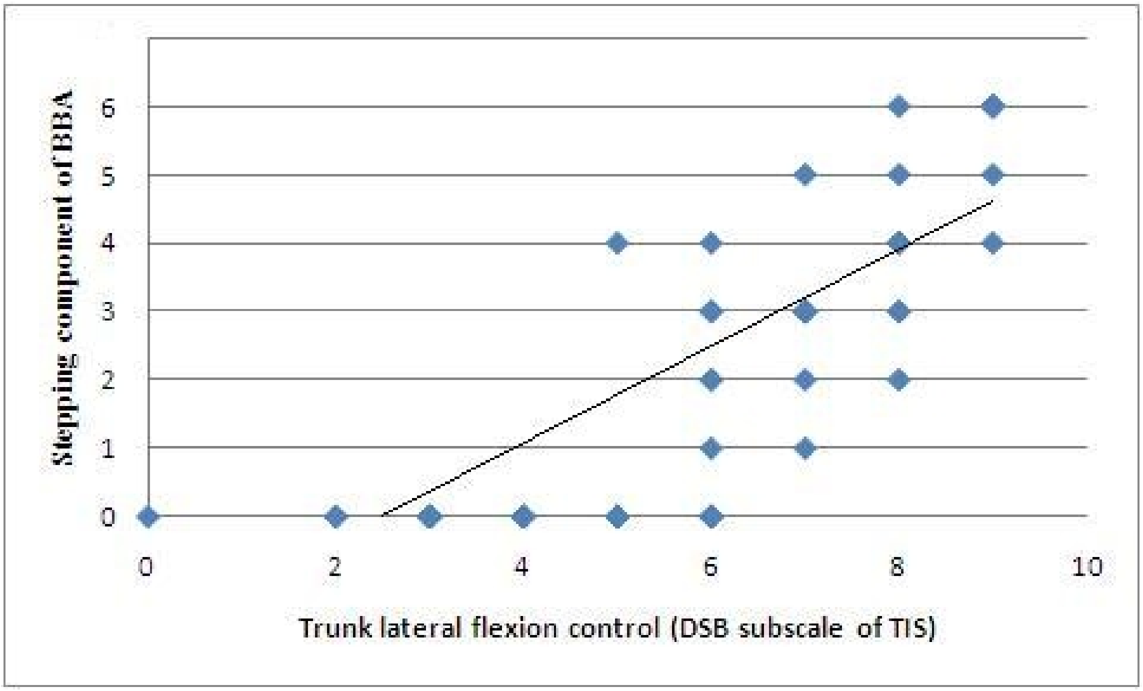


Figure 5: Correlation between trunk rotation control and BBA

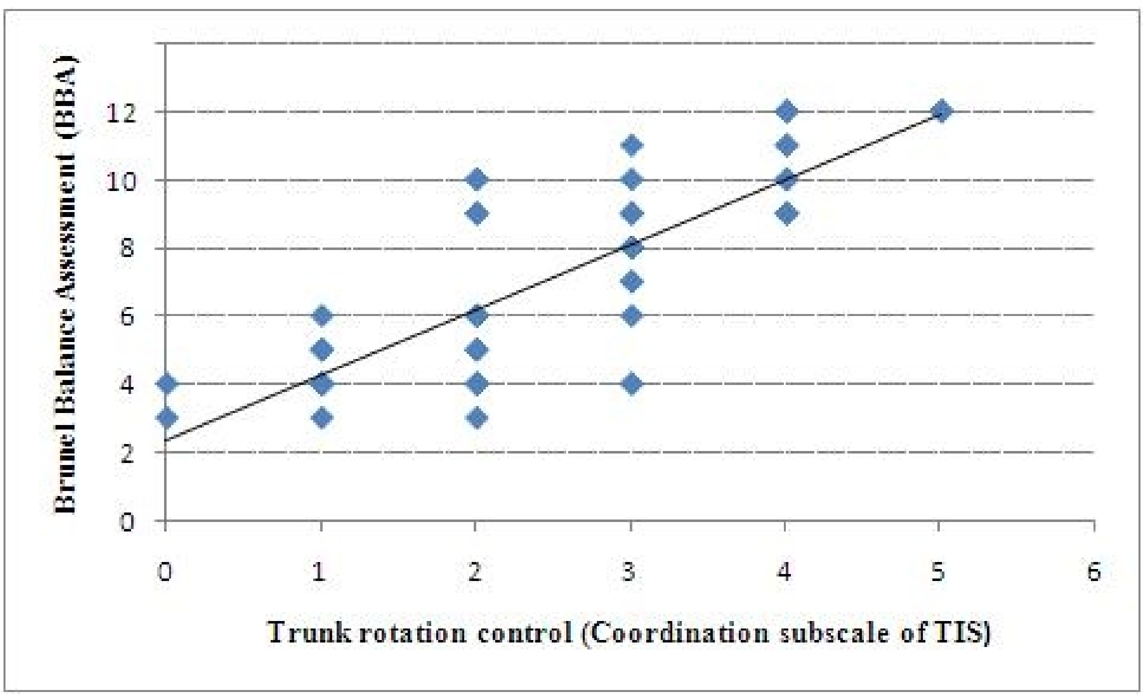


Figure 6: Correlation between trunk rotation control and stepping component of BBA

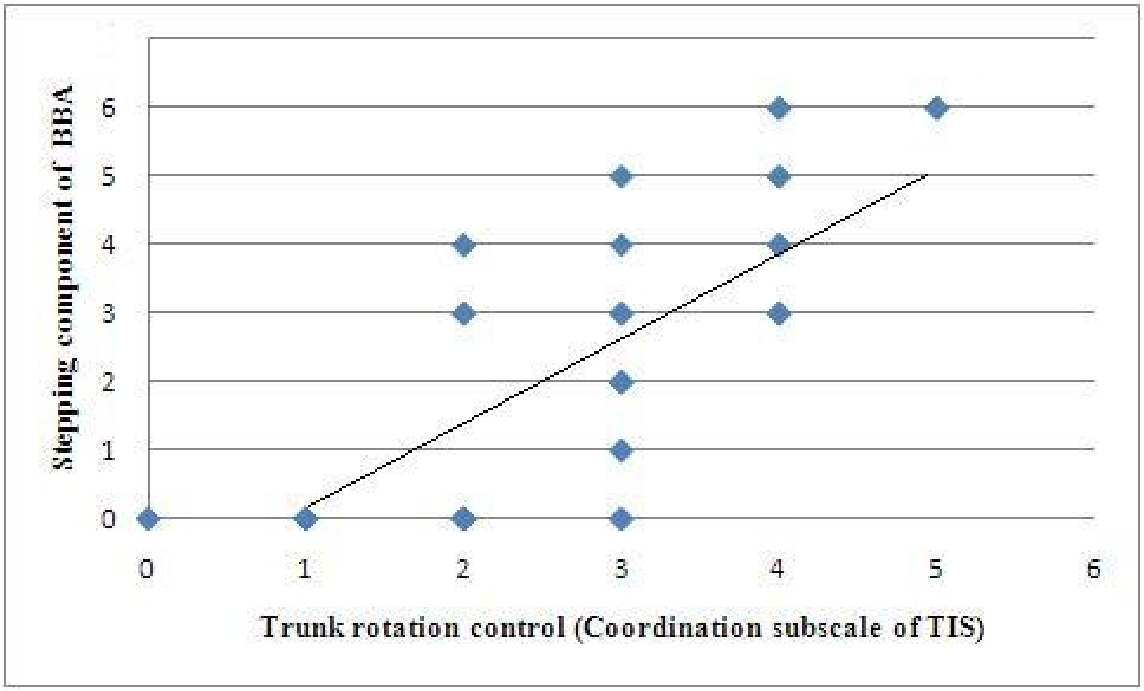


Figure 7: Correlation between dynamic sitting postural control and BBA

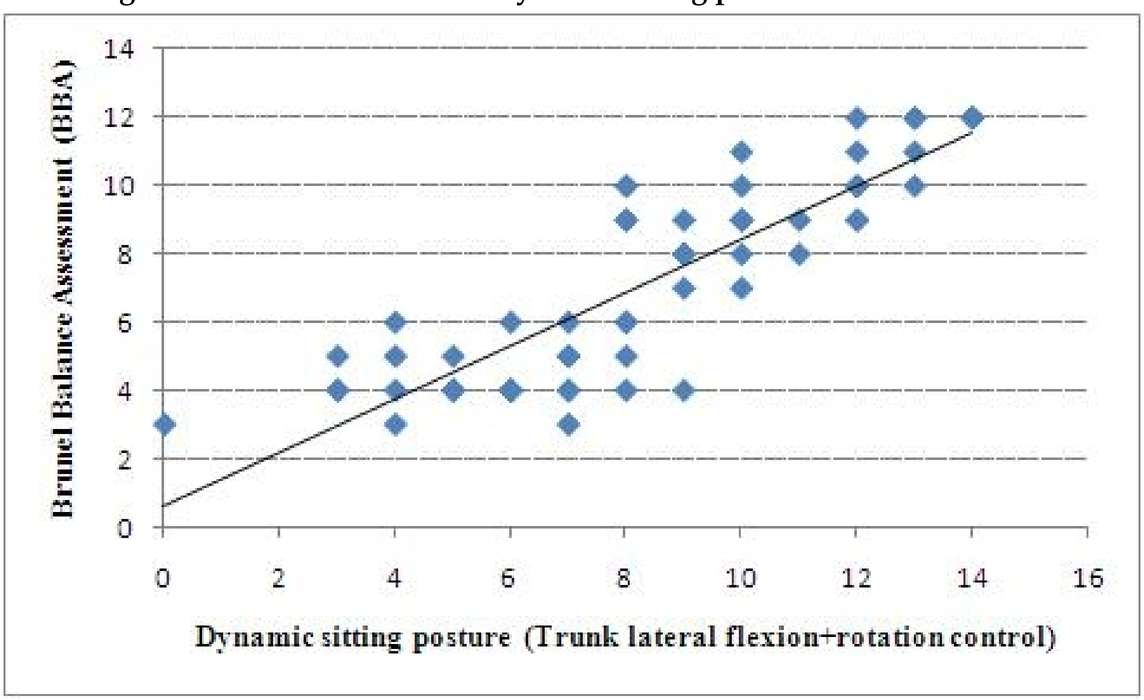
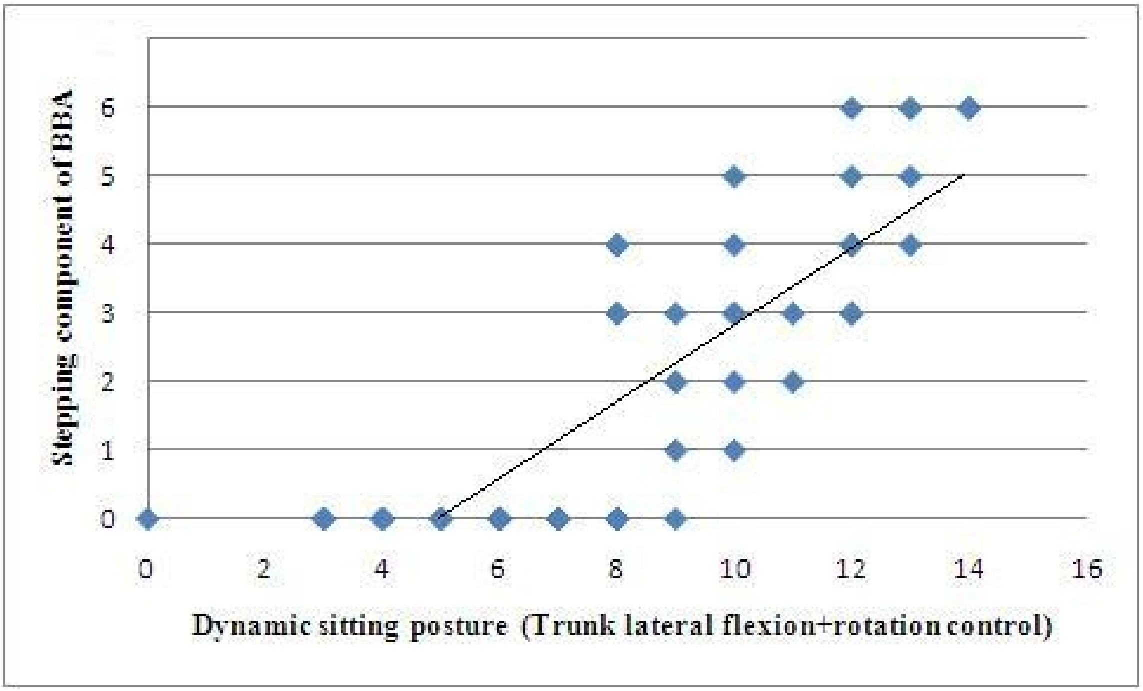


Figure 8: Correlation between dynamic sitting postural control and stepping component of BBA



Our study warrants caution when analyzing and interpreting the results due to the following limitations. Firstly, the severity of the stroke in accordance with site and extent of lesion was not considered. Secondly, the relationship between motor performance of trunk and hemiplegic limb was not assessed. Thirdly, the trunk performance and its correlation with the level of participation restriction were not examined. Fourthly, the participants were not selected in the study if they were not able to sit independently.

CONCLUSION

With the positive correlation between trunk performance during sitting and the measures of standing and stepping, we conclude that sitting postural control is prerequisite for standing and stepping postural control. Furthermore, our study also confirmed the established statement addressing that the static postural control is prerequisite for advanced level of dynamic postural control in order to attain postural stability in non-changing and/or changing base of support. This study provides an insight to physiotherapists who are involved in trunk rehabilitation for subjects early after stroke. The goal setting at the level of body structure and function, activity limitation for early stage stroke patients who are undergoing physiotherapy rehabilitation may be evaluated by TIS and its subscales, BBA and its subcomponents, respectively.

ACKNOWLEDGMENTS

We are grateful to all the patients for their active participation in this study.

REFERENCES

1. Banerjee TK, Das SK. Epidemiology of stroke in India. Neurology Asia. 2006; 11: 1- 4.
2. Devi MG, Gururaj G, Satishchandra P, Subbakrishna DK. Prevalance of neurological isorders in Bangalore, India: A community-based study with a comparison between urban and rural areas. Neuroepidemiology. 2004; 23: 261-68.
3. Sethi PK. Stroke- Incidence in India and management of ischemic stroke. Neurosciences. 2002; 6: 139-43.
4. Mackintosh SFH, Hill K, Dodd KJ, Goldie P, Culham E. Falls and injury prevention should be part of every stroke rehabilitation plan. Clin Rehabli. 2005; 19: 441-51.
5. Lord SE, McPherson K, McNaughton HK. Community ambulation after stroke: how i mportant and obtainable is it and what measures appear predictive? Arch Phys Med Rehabil. 2004; 85: 234-39.
6. Verheyden G, Nieuwboer A, De Wit L, Feys H, Schuback B, Baert I et al. Trunk performance after stroke: an eye catching predictor of functional outcome. J Neurol Neurosurg Psychiatry. 2007; 78: 694-98.
7. Franchignoni FP, Tesio L, Ricupero C, Martino MT. Trunk control test as an early predictor of stroke rehabilitation outcome. Stroke. 1997; 28: 1382-85.
8. Duarte E, Marco E, Muniese J, Belmonte R, Diaz P, Tejero M et al. Trunk control test as a functional predictor in stroke. J Rehabil Med. 2002; 34: 267-72.
9. Tsuji T, Liu M, Hase K, Chino N. Trunk muscles in persons with hemiparetic stroke evaluated with computed tomography. J Rehabil Med. 2003; 35: 184-88.
10. Fujiwara T, Sonoda S, Okajima Y, Chino N. The relationships between trunk function and the findings of transcranial magnetic stimulation among patients with stroke. J Rehabil Med. 2001; 33: 249-55.
11. Bohannon RW. Lateral trunk flexion strength: impairment, measurement reliability and i mplications following unilateral brain lesion. Int J Rehabil. 1992; 15: 249-51.
12. Karatas M, Cetin N, Bayramoglu M, Dilek A. Trunk muscle strength in relation to balance and functional disability in unihemispheric stroke patients. Am J Phys Med Rehabil. 2004; 83: 81-87.
13. Tanaka S, Hachisuka K, Ogata H. Muscle strength of the trunk flexion-extension in post-stroke hemiplegic patients. Am J Phys Med Rehabil. 1998; 77: 288-90.
14. Tanaka S, Hachisuka K, Ogata H. Trunk rotatory muscle performance in post-stroke hemiplegic patients. Am J Phys Med Rehabil. 1997; 76: 366-69.
15. Messier S, Bourbonnais D, Desrosiers J, Roy Y. Dynamic analysis of trunk flexion after stroke. *Arch Phys Med Rehabil*. 2004; 85: 1619-24.
16. Davis PM. Problems associated with the loss of selective trunk activity in hemiplegia. In: Right in the Middle. Selective trunk activity in the treatment of adult hemiplegia: Springer. 1990; 31-65.
17. Edwards S. An analysis of normal movement as the basis for the development of treatment techniques. In: Neurological physiotherapy. A problem-solving approach: Churchill Livingstone. 1996; 5-40.
18. Dickstein R, Shefi S, Marcovitz E, Villa Y. Anticipatory postural adjustments in selected trunk muscles in post-stroke hemiparetic patients. Arch Phys Med Rehabil. 2004; 85: 261-73.
19. Van Nes JW, Nienhuis B, Latour H, Geurtus AC. Posturographic assessment of sitting balance recovery in the sub-acute phase of stroke. Gait Posture. 2008; 28: 507-12.
20. Chern JS, Lo CY, Wu CY, Chen CL, Yang S, Tang FD. Dynamic postural control during trunk bending and reaching in healthy adults and stroke patients. Am J Phys Med Rehabil. 2010; 89: 186-97.
21. Hsieh CL, Sheu CF, Hsueh IP, Wang CH. Trunk control as an early predictor of comprehensive activities of daily living function in stroke patients. Stroke. 2002; 33: 2626-30.
22. Fujiwara T, Liu M, Tsuji T. Development of a new measure to assess trunk impairment after stroke (Trunk Impairment Scale): its psychometric properties. Am J Phy Med Rehabil. 2004; 83: 681-88.
23. Verheyden G, Nieuwboer A, Mertin J, Preger R, Kiekens C, De Weerdt W. The trunk impairment scale: a new tool to measure motor impairment of the trunk after stroke. Clin Rehabil. 2004; 18: 326-34.

24. Verheyden G, Nieuwboer A, Feys H, Thijs V, Vaes K, De Weerdt W. Discriminant ability of the Trunk Impairment Scale: a comparison between stroke patients and healthy individuals. Disabil Rehabi. 2005; 27: 1023-28.
25. Tyson S, DeSouza L. Development of the Brunel Balance Assessment: A new measure of balance disability post-stroke. Clin Rehabil 2004; 18: 801-10.
26. Tyson S, Hanley M, Chillala J, Selley A, Tallis R. Balance disability after stroke. Phys Ther. 2006; 86: 30-38.
27. Tyson SF. Measurement error in functional balance and mobility tests for people with stroke: what are the sources of error and what is the best way to minimize error? Neurorehabili Neural Repair. 2007; 21: 46-50.
28. Verheyden G, Vereeck L, Truijen S, Troch M, Herregodts I, Lafosse C et al. Trunk performance after stroke and relationship with balance, gait and functional ability. Clin Rehabil. 2006; 20: 451-58.
29. Demholdt E. Statistical analysis of relationships: The basics. In: Research fundamentals. Elseiver. 2000; 351-365.
30. Tyson SF, Connell LA. How to measure balance in clinical practice. A systematic review of the psychometrics and clinical utility of measures of balance activity for neurological conditions. Clin Rehabil. 2009; 23: 824-40.
31. Tyson SF, Hanley M, Chillala J, Selley A, Tallis RS. Balance disability after stroke. Phys Ther. 2006; 86: 30-38.
32. Blum L, Bitensky NK. Usefulness of berg balance scale in stroke rehabilitation. a systematic review. Phys Ther. 2008; 88: 559-566.
33. Wee JY, Wong H, Palepu A. Validation of the Berg

Instructions to authors

General Information

Manuscript should be prepared in accordance with the uniform requirements for manuscripts submitted to the biomedical journals compiled by the International Committee of Medical Journal Editors (ann. Intern. Med. 1992; 96: 766-767).

As per policy of the journal editorial committee it disapproves the submission of the same articles simultaneously to different journals for consideration as well as duplicate publication of the same article.

Submission of Manuscript

Manuscript should be forwarded via email to the Editor (redflowerppl@vsnl.net). The length of a paper is typically in the order of 15–30 journal pages. Manuscripts should use 12 point Times or Times New Roman fonts, double line spacing and in MS Word format. The manuscript should arrange as follow: Covering letter, Checklist, title page, abstract, keywords, introduction, methods, results, discussion, references, tables, legends to figures and figures. All pages should be numbered consecutively beginning with the title page. Signed declaration that the theme is of his own, and paper has not been published anywhere or not under consideration for publication.

Title page

It should contain the title, short title (if any), names of all authors (without degrees or diplomas), names and full address of institutions where the work was performed, acknowledgement, abbreviations (if any used), name and address of corresponding author along with email, and contact phone number.

Abstract

Structured abstract not more than 150 to 200 words. It must convey the essential features of the paper.

Key Words

Author should include 3-5 Key Words.

Introduction

It should contain the state why study was carried out and what were its specific aims and objectives.

Materials and Methods

These should describe the nature of materials and specific methods/procedures used to conduct the study. It also contains the statistical methods used for presentation and analysis of data and results.

Results

These should be concise and include only the tables and figures necessary to enhance the understanding the text.

Discussion

It should consist of a review of the literature and relate the major findings of the study to other publications on the subjects along with supporting references.

References

Authors are required to use the Vancouver style to cite/quote the references. The references should be numbered in the order in which they appear in the texts and these numbers should be inserted above the lines on each occasion the author is cited.

Examples of common forms of references are:-

Journal Article

Ansari Mehtab Alam, Kamal Mohd. Research on "Meningitis': a Bibliographic Study. Ind J Lib & Info Sci, 2008; 2(1): 5-12 (name of journal, year of publication, volume (issue) and pages).

Magazine

Gakhar Isha. Eco-friendly Bags in Fashion. Women on the Earth, 2008; 2: 28-28.

Newspaper

Parmar Vijaysinh. All this family got was their son's head, Times of India. 2008; July 29.

Book

Benjamin Lewin. Genes VI. New York; Oxford University Press, 1997

Book Chapter

Fisher M. Nosocomial. Infection and Infection Control. In Jenson H, Baltimore R. Pediatric Infectious Diseases. 2nd Ed, W.B. Sounders Company; 2002: 1221.

World Wide Web

Jutta M. Joesch et al. Does Your Child Have Asthma? Filled Prescriptions and Household Report of Child Asthma. Elsevier. http://www.jpedhc.org/article/S0891-5245(06)00129-5/abstract (August 21, 2008).

Guidelines for presentation of Tables and Figures

Tables

Tables should be typed in double spaced on separate sheets with table number (in Roman Arabic numerals) and title above the table and explanatory notes below the table.

Figures

The size and resolution guidelines below must be followed in order for electronic images to be of sufficient quality to be published in the Journal. The photographs and figures should be sent as saved with their links.

Photographs (halftones) and radiographs (either color or black and white) will be accepted in electronic form if the image is a minimum of 4 inches wide (any height) and a minimum resolution of 300 ppi/dpi. We can accept electronic files for photographic images in the following file formats: Adobe PhotoShop TIFF, EPS, JPEG. If JPEG settings are used on a digital camera, please ensure that the image resolution is set high enough to meet the 300 ppi requirement (the default setting on most cameras is 72 ppi). The photographs and figures should be sent as saved with their links.

Illustrations (black and white line art), charts, and graphs are often recreated in the Journal office. Digital images must be a minimum of 4 inches wide (any height), and the resolution must be 1200 ppi/dpi. We can accept electronic files for illustrations in the following file formats: TIFF, EPS, JPEG, and PDF. The output software must be either Adobe PhotoShop or Adobe Illustrator, or Adobe Acrobat (for PDF images). For hard-copy submissions, we can accept laser and inkjet prints (600 ppi or higher print resolution is preferred).

Forms (figures that reproduce questionnaires, flow charts, or other primarily-text material) should be submitted as data-processing (text) documents if that is practical.

If you have any questions about the technical guidelines, please contact us on e-mail: redflowerppl@vsnl.net.

The Editorial Board reserves all the rights to accept, alter or reject the article without any prior notice. The Editorial Board accepts no responsibility of the statements and opinion expressed by the contributors. No payments are made to the contributors.

DECLARATION FORM

(Should be sent with original signatures by all authors alongwith one hard copy of the article)

I hereby submit that the paper entitled "…………..." along with two photographs of mine. This paper is my original work and has neither been published anywhere else, electronically or in print, nor has been submitted elsewhere simultaneously for publication. I have agreed for this paper to be published in your renowned journal "**Indian Journal of Forensic Odontology**".

I vouchsafe that the authorship of this article will not be contested by anyone whose names are not listed by me here.

The article contains no libelous or other unlawful statements and does not contain any materials that violate any personal or proprietary rights of any other person or entity.

We also agree to the authorship of the paper in the following sequence:

Author's Names in Sequence	**Signatures of Authors**

Thanking you,

Yours Sincerely,
Name & complete address

Mail to
Red Flower Publication Pvt. Ltd.
41/48, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi – 110 091
India
Phone: 91-11-22754205, Fax: 91-11-22754205
E-mail: redflowerppl@gmail.com
Website: www.rfppl.com

STATEMENT ABOUT OWNERSHIP AND OTHER PARTICULARS ABOUT "Physiotherapy and Occupational Therapy Journal" (See Rule 8)

1. Place of Publication	:	Delhi
2. Periodicity of Publication	:	Quarterly
3. Printer's Name	:	Asharfi Lal
Nationality	:	Indian
Address	:	3/258-259, Trilok Puri, Delhi-91
4. Publisher's Name	:	Asharfi Lal
Nationality	:	Indian
Address	:	3/258-259, Trilok Puri, Delhi-91
5. Editor's Name	:	Asharfi Lal (Editor-in-Chief)
Nationality	:	Indian
Address	:	3/258-259, Trilok Puri, Delhi-91
6. Name & Address of Individuals	:	Asharfi Lal
who own the newspaper and particulars of shareholders holding more than one percent of the total capital	:	3/258-259, Trilok Puri, Delhi-91

I Asharfi Lal, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/-

(Asharfi Lal)

Indian Journal of Emergency Pediatrics

Subscription Form

I want to renew/subscribe to international class journal **"Physiotherapy and Occupational Therapy Journal"** of Red Flower Publication Pvt. Ltd.

Subscription Rates: India: Institutional: Rs.5000, Individual: Rs.1000, LIfe membership (10 years only for individulas) Rs.5000. All other countries: $200

Name and complete address (in capitals)...

....

Please find enclosed my Demand Draft No..............................dated... for Rs./USD.....................in favour of **Red Flower Publication Pvt. Ltd.** payable at **Delhi**.

1. Advance payment required by Demand Draft payable to Red Flower Publicaion Pvt. Ltd. payable at Delhi.
2. Cancellation not allowed except for duplicate payment.
3. Agents allowed 10% discount.
4. Claim must be made within six months from issue date.

SEND REMITTANCE TO

Red Flower Publication Pvt. Ltd.

41/48, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi - 110 091 (India)
Tel: 91-11-22754205, Fax: 91-11-22754205
E-mail: redflowerppl@vsnl.net, redflowerppl@gmail.com
Website: www.rfppl.com

Indian Journal of Genetics and Molecular Resarch

Call for editorial board member & authors

About the Journal

The Indian Journal of Genetics and Molecular Research (quarterly) will publish high-quality, original research papers, short reports and reviews in the rapidly expanding field of human genetics. The Journal considers contributions that present the results of original research in genetics, evolution and related scientific disciplines. The molecular basis of human genetic disease developmental genetics neurogenetics chromosome structure and function molecular aspects of cancer genetics gene therapy biochemical genetics major advances in gene mapping understanding of genome organization.

Editor-in-Chief
Dr. Seema Kapoor
Prof. of Genetics
Dept. of Peadiatrics
Maulana Azad Medical College & Associated LNJP Hospital
New Delhi – 110 002
India
E-mail: drseemakapoor@gmail.com

Please send your all quiries directly to the editor-in-chief or to

Red Flower Publication Pvt. Ltd.
41/48 DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091, India
Tel: 91-11-22754205, Fax: 91-11-22754205
E-mail: redflowerppl@vsnl.net, redflowerppl@gmail.com
Website: www.rfppl.com

Physiotherapy and Occupational Therapy Journal

Library Recommendation Form

If you would like to recommend this journal to your library, simply complete the form below and return it to us. Please type or print the information clearly. We will forward a sample copy to your library, along with this recommendation card.

Please send a sample copy to:

Name of Librarian

Library

Address of Library

Recommended by:

Your Name/ Title

Department

Address

Dear Librarian,

I would like to recommend that the library subscribe to the **Physiotherapy and Occupational Therapy Journal**. I believe the major future uses of the journal for our library would be:

1. As useful information for members of my specialty.
2. As an excellent research aid.
3. As an invaluable student resource.
4. **I have a personal subscription and understand and appreciate the value an institutional subscription would mean to our staff.**
5. Other

Should the journal you're reading right now be a part of your University or institution's library? To have a free sample sent to your librarian, simply fill out and mail this today!

Stock Manager

Red Flower Publication Pvt. Ltd.

41/48, DSIDC, Pocket-II, Mayur Vihar, Phase-I
P.O. Box No. 9108, Delhi - 110 091 (India)
Tel: 91-11-65270068, 22754205, Fax: 91-11-22754205
E-mail: redflowerppl@gmail.com, redflowerppl@vsnl.net
Website: www.rfppl.com