Call for Editorial Board Members

As you are well aware that we are a medical and health sciences publishers; publishing peer-reviewed journals and books since 2004.

We are always looking for dedicated editorial board members for our journals. If you completed your master's degree and must have at least five years experience in teaching and having good publication records in journals and books.

If you are interested to be an editorial board member of the journal; please provide your complete resume and affiliation through e-mail (i.e. info@rfppl.co.in) or visit our website (i.e. www.rfppl.co.in) to register yourself online.

Call for Publication of Conference Papers/Abstracts

We publish pre-conference or post-conference papers and abstracts in our journals, and deliver hard copy and giving online access in a timely fashion to the authors.

For more information, please contact:

For more information, please contact:
A Lal
Publication-in-charge
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi – 110 091 (India)
Phone: 91-011-79695648
E-mail: info@rfppl.co.in

Free Announcements of your Conferences/Workshops/CMEs

This privilege to all Indian and other countries conferences organizing committee members to publish free announcements of your conferences/ workshops. If you are interested, please send your matter in word formats and images or pictures in JPG/JPEG/Tiff formats through e-mail attachments to sales@rfppl.co.in.

Terms & Conditions to publish free announcements:

1. Only conference organizers are eligible up to one full black and white page, but not applicable for the front, inside front, inside back and back cover, however, these pages are paid.
2. Only five pages in every issue are available for free announcements for different conferences.
3. This announcement will come in the next coming issue and no priority will be given.
4. All legal disputes subject to Delhi jurisdiction only.
5. The executive committee of the Red Flower Publication reserve the right to cancel, revise or modify terms and conditions any time without prior notice.

For more information, please contact:
A Lal
Publication-in-charge
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi – 110 091 (India)
Phone: 91-011-79695648
E-mail: info@rfppl.co.in

Win Free Institutional Subscription!

Simply fill out this form and return scanned copy through e-mail or by post to us.

Name of the Institution_____
Name of the Principal/Chairman_____
Management (Trust/Society/Govt./Company)_____
Address 1_____
Address 2_____
Address 3_____
City_____
Country_____
PIN Code_____
Mobile_____
Email_____

We are regular subscriber of Red Flower Publication journals.

Year of first subscription_____

List of ordered journals (if you subscriberd more than 5 titles, please attach separate sheet)

Ordered through

Name of the Vendor	Subscription Year	Direct/subs Yr

Name of the journal for which you wish to be free winner

Terms & Conditions to win free institutional subscription

1. Only institutions can participate in this scheme
2. In group institutions only one institution would be winner
3. Only five institutions will be winner for each journal
4. An institution will be winner only for one journal
5. The free subscription will be valid for one year only (i.e. 1 Jan – 31 Dec)
6. This free subscription is not renewable, however, can be renewed with payment
7. Any institution can again participate after five years
8. All legal disputes subject to Delhi jurisdiction only
9. This scheme will be available to participate throughout year, but draw will be held in last week of August every year
10. The executive committee of the Red Flower Publication reserve the right to cancel, revise or modify terms and conditions any time without prior notice.

I confirm and certify that the above information is true and correct to the best of my knowledge and belief.

Place: Signature with Seal
Date:

Revised Rates for 2022 (Institutional) **Title of the Journal**	**Frequency**	**India(INR) Print Only**	**India(INR) Online Only**	**Outside India(USD) Print Only**	**Outside India(USD) Online Only**
Community and Public Health Nursing	3	6000	5500	469	430
Indian Journal of Agriculture Business	2	6000	5500	469	430
Indian Journal of Anatomy	4	9000	8500	703	664
Indian Journal of Ancient Medicine and Yoga	4	8500	8000	664	625
Indian Journal of Anesthesia and Analgesia	6	8000	7500	625	586
Indian Journal of Biology	2	6000	5500	469	430
Indian Journal of Cancer Education and Research	2	9500	9000	742	703
Indian Journal of Communicable Diseases	2	9000	8500	703	664
Indian Journal of Dental Education	4	6000	5500	469	430
Indian Journal of Diabetes and Endocrinology	2	8500	8000	664	625
Indian Journal of Emergency Medicine	4	13000	12500	1016	977
Indian Journal of Forensic Medicine and Pathology	4	16500	16000	1289	1250
Indian Journal of Forensic Odontology	2	6000	5500	469	430
Indian Journal of Genetics and Molecular Research	2	7500	7000	586	547
Indian Journal of Law and Human Behavior	3	6500	6000	508	469
Indian Journal of Legal Medicine	2	9000	8500	703	664
Indian Journal of Library and Information Science	3	10000	9500	781	742
Indian Journal of Maternal-Fetal & Neonatal Medicine	2	10000	9500	781	742
Indian Journal of Medical and Health Sciences	2	7500	7000	586	547
Indian Journal of Obstetrics and Gynecology	4	10000	9500	781	742
Indian Journal of Pathology: Research and Practice	6	12500	12000	977	938
Indian Journal of Plant and Soil	2	7000	6500	547	508
Indian Journal of Preventive Medicine	2	7500	7000	586	547
Indian Journal of Research in Anthropology	2	13000	12500	1016	977
Indian Journal of Surgical Nursing	3	6000	5500	469	430
Indian Journal of Trauma and Emergency Pediatrics	4	10000	9500	781	742
Indian Journal of Waste Management	2	10000	9500	781	742
International Journal of Food, Nutrition & Dietetics	3	6000	5500	469	430
International Journal of Forensic Science	2	10500	10000	820	781
International Journal of Neurology and Neurosurgery	4	11000	10500	859	820
International Journal of Pediatric Nursing	3	6000	5500	469	430
International Journal of Political Science	2	6500	6000	508	469
International Journal of Practical Nursing	3	6000	5500	469	430
International Physiology	3	8000	7500	625	586
Journal of Animal Feed Science and Technology	2	8300	7800	648	609
Journal of Cardiovascular Medicine and Surgery	4	10500	10000	820	781
Journal of Emergency and Trauma Nursing	2	6000	5500	469	430
Journal of Forensic Chemistry and Toxicology	2	10000	9500	781	742
Journal of Global Medical Education and Research	2	6400	5900	500	461
Journal of Global Public Health	2	12500	12000	977	938
Journal of Microbiology and Related Research	2	9000	8500	703	664
Journal of Nurse Midwifery and Maternal Health	3	6000	5500	469	430
Journal of Orthopedic Education	3	6000	5500	469	430
Journal of Pharmaceutical and Medicinal Chemistry	2	17000	16500	1328	1289
Journal of Plastic Surgery and Transplantation	2	26900	26400	1954	575
Journal of Psychiatric Nursing	3	6000	5500	469	430
Journal of Social Welfare and Management	4	8000	7500	625	586
New Indian Journal of Surgery	6	8500	7500	664	625
Ophthalmology and Allied Sciences	3	6500	6000	508	469
Pediatric Education and Research	4	8000	7500	625	586
Physiotherapy and Occupational Therapy Journal	4	9500	9000	742	703
RFP Indian Journal of Medical Psychiatry	2	8500	8000	664	625
RFP Journal of Biochemistry and Biophysics	2	7500	7000	586	547
RFP Journal of Dermatology (Formerly Dermatology International)	2	6000	5500	469	430
RFP Journal of ENT and Allied Sciences (Formerly Otolaryngology International)	2	6000	5500	469	430
RFP Journal of Hospital Administration	2	7500	7000	586	547
Urology, Nephrology and Andrology International	2	8000	7500	625	586
Coming Soon					
RFP Gastroenterology International	2	–	–	–	–
Journal of Food Additives and Contaminants	2	–	–	–	–
Journal of Food Technology and Engineering	2	–	–	–	–
Journal of Radiology	2	–	–	–	–
Medical Drugs and Devices	3	–	–	–	–
RFP Indian Journal of Hospital Infection	2	–	–	–	–
RFP Journal of Gerontology and Geriatric Nursing	2	–	–	–	–

Terms of Supply:

1. Agency discount 12.5%. Issues will be sent directly to the end user, otherwise foreign rates will be charged.
2. All back volumes of all journals are available at current rates.
3. All journals are available free online with print order within the subscription period.
4. All legal disputes subject to Delhi jurisdiction.
5. Cancellations are not accepted orders once processed.
6. Demand draft/cheque should be issued in favour of "**Red Flower Publication Pvt. Ltd.**" payable at **Delhi.**
7. Full pre-payment is required. It can be done through online (http://rfppl.co.in/subscribe.php?mid=7).
8. No claims will be entertained if not reported within 6 months of the publishing date.
9. Orders and payments are to be sent to our office address as given below.
10. Postage & Handling is included in the subscription rates.
11. Subscription period is accepted on calendar year basis (i.e. Jan to Dec). However orders may be placed any time throughout the year.

Order from

Red Flower Publication Pvt. Ltd., 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi - 110 091 (India)
Mobile: 8130750089, Phone: 91-11-79695648, E-mail: info@rfppl.co.in, Website: www.rfppl.co.in

Physiotherapy and Occupational Therapy Journal **POTJ**

Editor-in-Chief
Meenakshi Singh
Amity Institute of Physiotherapy, Noida

Former Editor-in-Chief
Narasimman S, Mangalore

National Editorial Advisory Board

Akshat Pandey, Rohtak
Asir John Samuel, Mullana
Beulah Jebakani, Pondicherry
Davinder Kumar Gaur, Delhi
Manisha Uttam, Patiala
Meenakshi, Rohtak
Niraj Kumar, Dehradun
Neeraj Kumar, Loni
Ravinder Narwal, Dehradun
Sanjai Kumar, Meerut
Shivani Bhatt, Changa
Vaibhav Agarwal, Dehradun
Vencita Priyanka Aranha, Mullana

International Editorial Advisory Board

Sabitha Eunice Regima, MAHSA University, Saujana Putra, Malaysia
Kedar Mate, McGill University, Montreal, Hutchinson, Canada
Krunal Vishwas Desai, Physical Medicine & Rehabilitation Hospital, Kuwait
Md. Abu Shaphe, Jazan University, Saudi Arabia

Managing Editor
A. Lal

Publication Editor
Dinesh Kr. Kashyap

Indexing information: Index Copernicus, Poland; NLM catalogue & locator plus, USA; JournalSeek; World Cat; Gaudeamus Academia; Science Library Index; The International Committee of Medical Journal Editors (ICMJE).

© 2022 Red Flower Publication Pvt. Ltd. All rights reserved.

The views and opinions expressed are of the authors and not of the **Physiotherapy and Occupational Therapy Journal.** Physiotherapy and Occupational Therapy Journal does not guarantee directly or indirectly the quality or efficacy of any product or service featured in the advertisement in the journal, which are purely commercial.

Corresponding address
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II,
Mayur Vihar, Phase-I
Delhi - 110 091 (India),
Phone: 91-11-79695648
E-mail: info@rfppl.co.in,
Website: www.rfppl.co.in

© Red Flower Publication Pvt. Ltd.

The Physiotherapy and Occupational Therapy Journal (pISSN: 0974–5777, eISSN: 2455-8362, Registered with Registrar of Newspapers for India: DELENG/2007/22242) 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.

Readership: Physiotherapist, Occupational therapists, medical engineers, epidemiologists, family physicians, occupational health nurses etc.

Subscription Information

Individual (1 year): Contact us

Institutional (1 year): INR 9500/USD 742

Payment methods

Bank draft / cashier s order / check / cheque / demand draft / money order should be in the name of **Red Flower Publication Pvt. Ltd.** payable at **Delhi.**

International Bank transfer / bank wire / electronic funds transfer / money remittance / money wire / telegraphic transfer / telex

1. **Complete Bank Account No.** 604320110000467
2. **Beneficiary Name (As per Bank Pass Book):** Red Flower Publication Pvt. Ltd.
3. **Address:** 41/48, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi – 110 091(India)
4. **Bank & Branch Name:** Bank of India; Mayur Vihar
5. **Bank Address & Phone Number:** 13/14, Sri Balaji Shop, Pocket II, Mayur Vihar Phase- I, New Delhi - 110091 (India); Tel: 22750372, 22753401. Email: mayurvihar.newdelhi@bankofindia.co.in
6. **MICR Code:** 110013045
7. **Branch Code:** 6043
8. **IFSC Code:** BKID0006043 (used for RTGS and NEFT transactions)
9. **Swift Code:** BKIDINBBDOS
10. **Beneficiary Contact No. & E-mail ID:** 91-11-79695648, E-mail: info@rfppl.co.in

Online You can now renew online using our RFPPL renewal website. Visit http://rfppl.co.in/subscribe.php?mid=7 and enter the required information and than you will be able to pay online.

Send all Orders to: Subscription and Marketing Manager, Red Flower Publication Pvt. Ltd., 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi - 110 091(India), Mobile: 8130750089, Phone: 91-11-79695648. E-mail: sales@rfppl.co.in.

Physiotherapy and Occupational Therapy Journal

POTJ

January - March 2022
Volume 15, Number 1

Contents

© Red Flower Publication Pvt. Ltd.

Red Flower Publication (P) Ltd.

Presents its Book Publications for sale

1. **Beyond Medicine: A to E for Medical Professionals) (2020)**
   Kalidas Chavan **INR390/USD31**
2. **Biostatistical Methods For Medical Research (2019)**
   Sanjeev Sarmukaddam **INR549/USD44**
3. **Breast Cancer: Biology, Prevention And Treatment (2015)**
   Dr. A. Ramesh Rao **INR 395/USD31**
4. **Chhotanagpur A Hinterland of Tribes (2020)**
   Ambrish Gautam **INR250/ USD20**
5. **Child Intelligence (2004)**
   Dr. Rajesh Shukla, Md, Dch. **INR100/ USD50**
6. **Clinical Applied Physiology and Solutions (2020)**
   Varun Malhotra **INR263/USD21**
7. **Comprehensive Medical Pharmacology (2019)**
   Dr. Ahmad Najmi **INR599/USD47**
8. **Critical Care Nursing in Emergency Toxicology (2019)**
   Vivekanshu Verma **INR460/USD34**
9. **Digital Payment (Blue Print For Shining India) (2020)**
   Dr. Bishnu Prasad Patro **INR329/USD26**
10. **Drugs in Anesthesia (2020)**
    R. Varaprasad **INR449/USD35**
11. **Drugs In Anesthesia and Critical Care (2020)**
    Dr. Bhavna Gupta **INR595/USD46**
12. **MCQs in Medical Physiology (2019)**
    Dr. Bharati Mehta **INR300/ USD29**
13. **MCQs in Microbiology, Biotechnology and Genetics (2020)**
    Biswajit Batabyal **INR285/USD22**
14. **MCQs In Minimal Access & Bariatric Surgery (2019)**
    Anshuman Kaushal **INR450/USD35**
15. **MCQs In Minimal Access and Bariatric Surgery (2nd Edition) (2020)**
    Anshuman Kaushal **INR545/USD42**
16. **Patient Care Management (2019)**
    A.K. Mohiuddin **INR999/USD78**
17. **Pediatrics Companion (2001)**
    Rajesh Shukla **INR 250/USD50**
18. **Pharmaceutics-1 (A Comprehensive Hand Book) (2021)**
    V. Sandhiya **INR525/ USD50**
19. **Poultry Eggs of India (2020)**
    Prafulla K. Mohanty **INR390/USD30**
20. **Practical Emergency Trauma Toxicology Cases Workbook (2019)**
    Dr. Vivekanshu Verma, Dr. Shiv Rattan Kochar, Dr. Devendra Richhariya **INR395/USD31**
21. **Practical Record Book of Forensic Medicine & Toxicology (2019)**
    Dr. Akhilesh K. Pathak **INR299/USD23**
22. **Recent Advances in Neonatology (2020)**
    Dr. T.M. Ananda Kesavan **INR 845/USD66**
23. **Shipping Economics (2018)**
    Dr. D. Amutha **INR347/USD45**
24. **Skeletal and Structural Organizations of Human Body (2019)**
    Dr. D.R. Singh **INR659/USD51**
25. **Statistics In Genetic Data Analysis (2020)**
    S.Venkatasubramanian **INR299/USD23**
26. **Synopsis of Anesthesia (2019)**
    Dr. Lalit Gupta **INR1195/USD75**

Order from

Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi - 110 091(India)
Mobile: 8130750089, Phone: 91-11-79695648, E-mail: info@rfppl.co.in

Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 1, January - March 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15122.1

Short Term Effect of Active Cycle Breathing Technique and Mechanical Vibration among the Patients with Chronic Bronchitis

Kapil Rastogi[1], Sumit Raghav[2], Anshika Singh[3], Surendar Kumar[4], Gaurav Pratap Tyagi[5]

How to cite this article:
Kapil Rastogi, Sumit Raghav, Anshika Singh, et. al, Short Term Effect of Active Cycle Breathing Technique and Mechanical Vibration among the Patients with Chronic Bronchitis. Physiotherapy and Occupational Therapy Journal. 2022;15(1): 9-15.

ABSTRACT

Objective: The purpose of this study was to evaluate the effect of ACBT and Mechanical Vibration on chest expansion among the patients with chronic bronchitis.

Methodology: It was a pre and post experimental design study. The patients diagnosed with chronic bronchitis which shows signs and symptoms and were requested to participate in study. The total number of patients 30 was enrolled in this study but on the basis of inclusion and exclusion criteria. Patients were equally divided into two groups, group A and group B respectively. Group A received ACBT and group B received mechanical vibration. Purpose of this study was explained to the patients. An informed consent was taken from each patient prior to participate in this study. This study was conducted at respiratory medicine ward and intensive care unit, CSS Hospital, Swami Vivekanand Subharti University, Meerut India.

Result: In both groups, p-value was significant i.e., $p<0.10$ with Chest expansion score (0.0000), (0.0000) and (0.0000). The 10 days protocol of ACBT and mechanical vibration showed difference in both group individually in improving chest expansion but group B, Mechanical vibration technique showed statistically more significant difference in improving chest expansion from 1st to 10th day.

Conclusion: 10 days, both chest physiotherapy techniques resulted in significant effect in both groups individually in improving chest expansion but group B received mechanical vibration technique showed statistically more significant difference in pre to post chest expansion score on consecutive day of protocol.

Keywords: .

Author Affiliation:
[1]Assistant Professor, [4]Assistant Professor & HOD, Department of Cardiopulmonary Physiotherapy, [2]Assistant Professor and Head, Department of Orthopedic Physiotherapy, [3]Assistant Professor, Department of Neurological Physiotherapy, [5]Clinical Physiotherapist, Subharti College of Physiotherapy, Swami Vivekananda Subharti University, Meerut 250005, Uttar Pradesh, India.

Corresponding Author: Sumit Raghav, Assistant Professor and Head, Department of Orthopedic Physiotherapy, Subharti College of Physiotherapy, Swami Vivekananda Subharti University, Meerut 250005, Uttar Pradesh, India

E-mail: drsumit.svsu@gmail.com

Recieved on 16.12.2021

Accepted on 25.01.2022

INTRODUCTION

Chronic bronchitis is a disease characterized by cough producing sputum for at least 3 months and for 2 consecutive years. Pathological changes include and increase the size of the tracheobronchial mucous glands and goblet cell hyperplasia. Chronic bronchitis results from long-term irritation of the tracheobronchial tree.[1] This is more common in middle to late adult life and in men more than women (ratio 5:1). Atmospheric pollution (e.g. cigarette smoking or coal dust) will predispose to the developmental of the disease and is more common in urban areas than rural areas.[2] The most common cause of irritation is cigarette smoking. Inhaled smoke stimulates the goblet cells and mucous glands to secrete excessive mucus. Other factors that have been implicated are air pollution certain occupational environments, and recurrent bronchial infections.[3]

The main clinical features are vesicular breathing with prolonged

© Red Flower Publication Pvt. Ltd.

expiration, inspiratory and expiratory rhonchi and crackles at the bases of lungs and later on six minutes walking test will give the disability.[4] On examination, sputum for culture and sensitivity and chest x-ray may be normal but some cases show increased bronchovascular marking.[5] FEV1 is reduced, FEV1/VC is subnormal, PEF is reduced, lungs volumes are normal except with emphysema and diffused lung capacity is normal while performing some specific tests.[6] In later stage, there will be chance of some complications such as type-l respiratory failure and type-ll respiratory failure, pulmonary arterial hypertension and cor pulmonale, secondary infections and Secondary polycythemia.

There are various approaches to handle the sign and symptoms of this condition. There are antibiotics, corticosteroids, bronchodilators, mucolytic agents, and oxygen therapy[7] etc. that help to minimize the severity of symptoms and improve the quality of life of patients. Chest physiotherapy is the term for a group of treatment designed to improve respiratory efficiency promote expansion of the lung, strengthen respiratory muscles, and eliminate secretions from the respiratory system.[8] Chest physiotherapy may be good option in terms in improving the lung as well as cardiopulmonary function.

Active Cycle Breathing Technique (ACBT) includes cycle of breathing control, thoracic expansion exercise, and forced expiratory technique. Diaphragmatic breathing is intended to help in using the diaphragm correctly while breathing strengthen the diaphragm, decrease the work of breathing by slowing the breathing rate and decrease the oxygen demand so that one can use less effort and energy to breathe.[9] The purpose of this study was to find out the comparative effect between ACBT and mechanical vibration among the patients with chronic bronchitis.

HYPOTHESIS

Experimental Hypothesis

There will be significant difference between the effect of ACBT and mechanical vibration among the patients with chronic bronchitis.

Null Hypothesis

There will be no significant difference between the effect of ACBT and mechanical vibration among the patients with chronic bronchitis.

METHODOLOGY

It was a pre and post experimental design study. The patients diagnosed with chronic bronchitis which shows signs and symptoms and were requested to participate in study. The total number of patients 30 was enrolled in this study but on the basis of inclusion and exclusion criteria. Patients were equally divided into two groups, group A and group B respectively. Group A received ACBT and group B received mechanical vibration. Purpose of this study was explained to the patients. An informed consent was taken from each patient prior to participate in this study. This study was conducted at respiratory medicine ward and intensive care unit, CSS Hospital, Swami Vivekanand Subharti University, Meerut India.

Selection criteria

Age between 40-70 year, gender both male and female, environmental and occupational pollution, presence of cough with expectoration, dyspnea, passive smoking, chest pain, chest tightness were included. Chest trauma, thoracic surgery, chest deformity, restricted lung disease, active smoking were excluded in this study.

Protocol

Mechanical Vibration

Mechanical chest vibrator is available to administrate the treatment and is useful for patient to clear the airway. The mechanical chest vibrator may be used on patient to the thoracic wall. Mechanical chest vibrator is proposed from to enhance mucocilliary transport from the periphery of the lung fields to the large airways.

Since vibration is used in conjunction to the effect of rate of secretion clearance and sputum production are increases. A mechanical vibrator are used most commonly respiratory condition patients, may be preferred by a caregiver to deliver long-term airway clearance. Treatment was given under the supervision, given twice a day. Treatment duration 20 to 30 sec for 1 time on a regular sessions such as 1st to 3rd day – 12 to 10 times per session, on 4th to 6th day - 8 to 6 times per session and on 7th to 10th day - 6 to 4 times per session.

Fig. 1: Performing mechanical chest vibration.

Active cycle of breathing techniques (ACBT)

Patient was in a relaxed, sitting, or reclined position on bed. Do several minutes of relaxed diaphragmatic breathing (breathing control). Take 3–4 active deep inspirations with passive relaxed exhalation (Thoracic expansion exercises). Do relaxed diaphragmatic breathing (breathing control). As you feel secretions entering the larger central airway, do 2–3 huffs (forced exhalation technique) starting at low volume, followed by 2–3 huffs at higher volume, followed by relaxed breathing control. Repeat the cycle 2–4 times, as tolerated.

Fig. 2: Patient performing active cycle breathing technique.

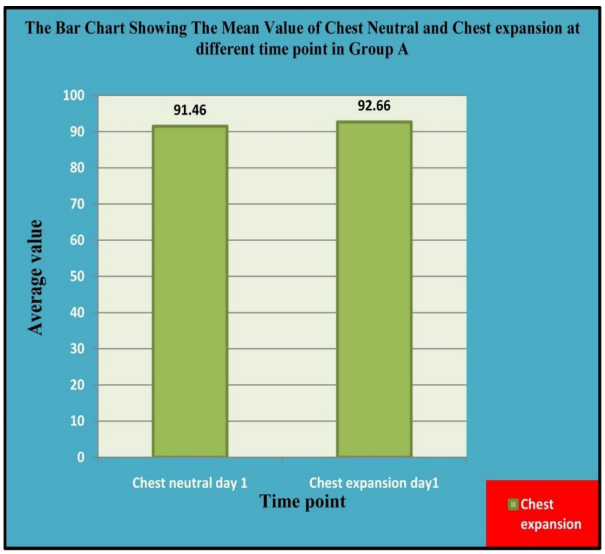
Data analysis

All analysis was obtained using SPSS version 20.0. All the values of airway clearance and chest expansion at different time points for Group A and Group B are expressed in terms of mean ± S D respectively. The paired "t" test was applied to test the significant difference between (1st and 10th day) for chest expansion in Group A, Group B and Group A versus Group B respectively, which show significant difference at $\alpha = .10$ level of significance. i.e. ($P<.10$).

Results

Table 1: showing mean, S.D comparison between the chest expansion and chest neutral day on 1st day and probability of "t" (paired) value of group A.

Outcome Measure	(Mean ± SD)	"t" (paired)	P-value
Chest Neutral on 1st day	91.46 ± 7.22	–	–
Chest Expansion on 1st day	92.66 ± 7.33	0.1	P<0.655

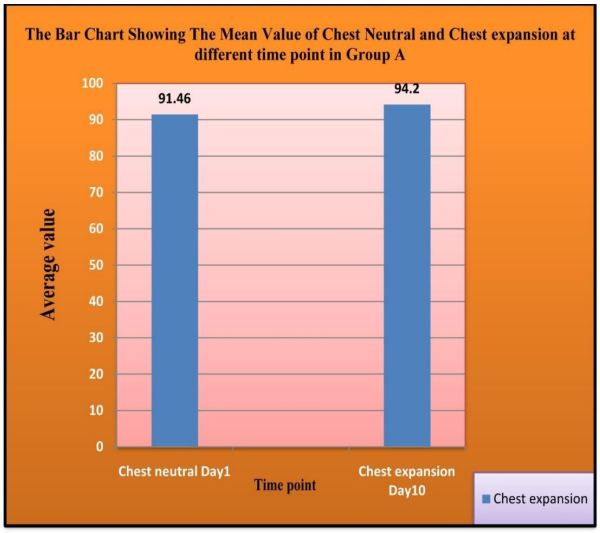


A 1 (a)

The graph shows significant improvement in chest expansion at neutral day after 1st day of treatment, which is approximately 1.30% as compared to its normal value 10%.

Table 2: showing mean, S.D, Comparison between the chest neutral and chest expansion at 1st day and 10th day treatment successive time point and probability of "t" (paired) value of group A

Outcome Measure	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest neutral on 1st day	91.46 ± 7.22	–	–
Chest expansion on 10th day	94.20 ± 7.38	0.1	P<0.3128

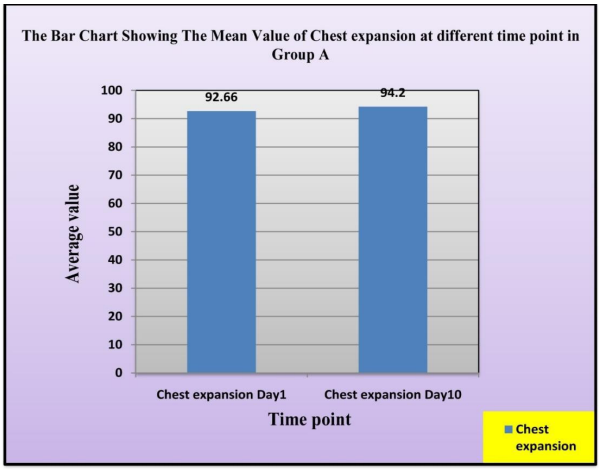


A 2 (a)

The graph shows significant improvement in chest expansion at neutral day after 10th day of treatment, which is approximately 2.90% as compared to its normal value 10%.

Table 3: showing mean, S.D, comparison between the chest expansion day 1st and 10th day treatment successive time point and probability of "t" (paired) value of group A.

Outcome Measures	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest expansion on 1st day	92.66 ± 7.33	0.1	P<0.655
Chest expansion 10th day	94.20 ± 7.38	0.1	P<0.3128

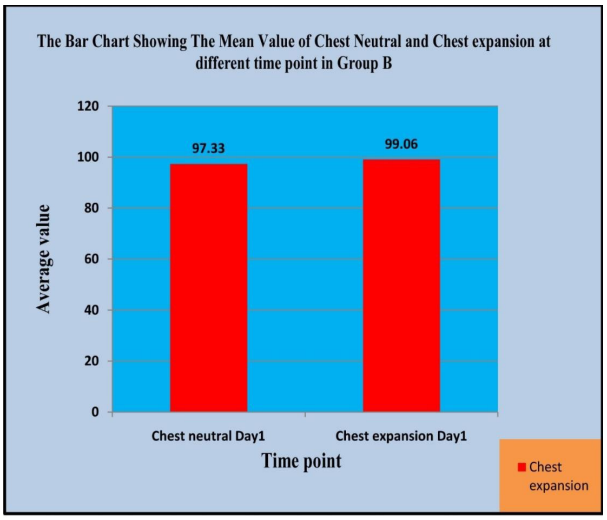


A 3 (a)

The graph shows significant improvement in chest expansion at 1st day and 10th day of treatment, which is approximately 1.65% as compared to its normal value 10%.

Table 4: showing mean, S.D, comparison between the chest expansion at neutral day and 1st day of treatment successive time point and probability of "t" (paired) value of group B.

Outcome Measures	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest neutral on 1st day	97.33 ± 7.33	–	–
Chest expansion on 1st day	99.06 ± 7.52	0.1	P<0.538

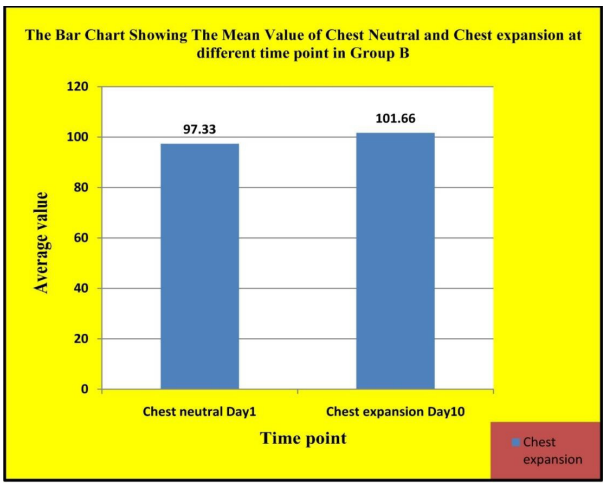


B 1 (b)

The graph shows significant improvement in chest expansion at neutral day after 1st day of treatment, which is approximately 1.75% as compared to its normal value 10%.

Table 5: showing mean, S.D comparison between the chest expansion and chest neutral on 1st day and 10th day treatment successive time point and probability of "t" (paired) value of group B

Outcome Measures	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest neutral on 1st day	97.33 ± 7.73	–	–
Chest expansion on 10th day	101.66 ± 7.62	0.1	P<0.133

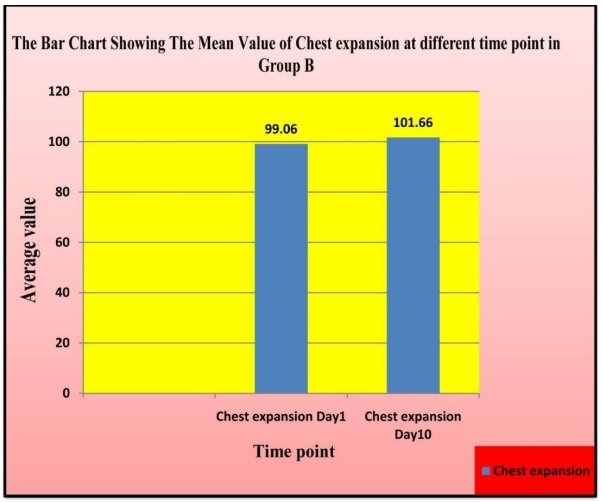


B 2 (b)

The graph shows significant improvement in chest expansion at neutral day after 10th day of treatment, which is approximately 4.26% as compared to its normal value 10%.

Table 6: showing mean, S.D comparison between the chest expansion 1st day and 10th day treatment successive time point and probability of "t" (paired) value of group B.

Outcome Measures	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest expansion on 1st day	99.06 ± 7.51	0.1	P<0.538
Chest expansion on 10th day	101.66 ± 7.62	0.1	P<0.3547

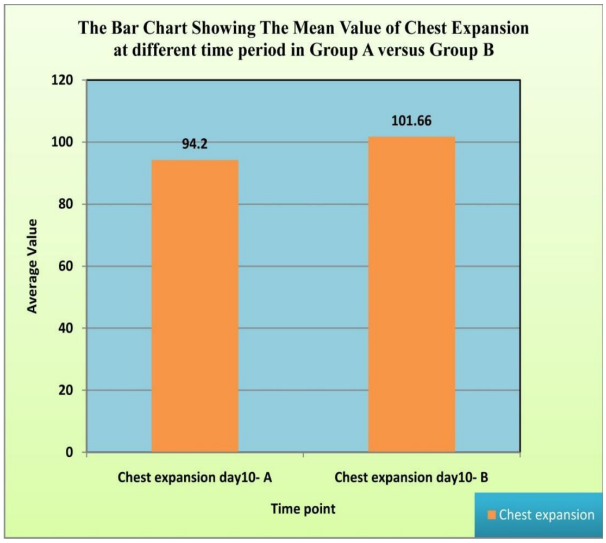


B 3 (b)

The graph shows significant improvement in chest expansion at 1st day and 10th day of treatment, which is approximately 2.56% as compared to its normal value 10%.

Table 7: Showing mean, S.D comparison between the group A versus Group B chest expansion on 10th day treatment successive time point and probability of "t" (paired) value.

Outcome Measure	(Mean ± SD)	Probability of "t" (paired)	P-value
Chest expansion on 10th day Group-A	94.20 ± 7.39	0.1	P<0.0110
Chest expansion on 10th day Group-B	101.66 ± 7.62	0.1	P<0.0110



A 3 B 3 (b)

The graph shows significant improvement in chest expansion at Group A versus Group B 10th day of treatment which is approximately 7.34% as compared to its normal value 10%.

DISCUSSION

Significant improvement was found in chest expansion values of both groups A and B. Group A which received manual chest physiotherapy (Active cycle of breathing techniques) shows P value of chest expansion as P<.10 approximately 1.65% after 10 days of treatment. Group B which received mechanical chest physiotherapy (mechanical chest vibration) shows P value of chest expansion as P<.10 approximately 2.56% after 10 days of treatment.

After comparison of both groups, Group B has shown near normal value of 2.56% which is highly significant than Group A. Hence, the result of the study revealed that using mechanical chest vibrator along with chest physiotherapy for 10 days treatment reduces the symptoms and improves the chest expansion. Previous studies have been conducted on the effect of chest physiotherapy in various cardiopulmonary conditions.

Bott J et. al did study on effectiveness of the chest physiotherapy in manual techniques include percussion (chest clapping) over the chest wall and shaking or mechanical vibration, with loosening secretion of cough with expectoration. Their study concluded that the chest physiotherapy is effective in terms of removal of congestion and improving breathing.[10]

McCarren et al did study on mechanical vibrator techniques are used as an airway clearance technique for effectiveness chronic bronchitis. The technique is interpretation of compliance of the chest wall and applying appropriate forces. The purpose of their study to assess consistency of forces used during vibrations and shaking incorporating a method measuring forces via a force platform. This technique was effective in terms of improving breathing pattern and quality of life of patients.[11]

Our study support the experimental hypothesis as mechanical vibration is more effective than ACBT in improving chest expansion on consecutive day among the patients with chronic bronchitis.

CONCLUSION

The above statistical data of prognosis of the patient lead to following conclusion though Active cycle of breathing techniques and Mechanical chest vibration both increases the chest expansion, and clear the lungs field hence reduces the risk of respiratory failure and pulmonary complication. But now it is very clear that treatment of Chronic bronchitis through Mechanical chest vibration is much more effective as compared to Manual chest physiotherapy (Active cycle of breathing techniques).

REFERENCES

1. Chest, Heart and Vascular Disorder 4th edition Cash's text book of physiotherapists. Page- 90.
2. S N Chugh text book of medicine edition 2nd Chronic Obstructive Pulmonary Diseases, Pages- 333-335.
3. Ann Thomson, Alison Skkiner, Joan Piercy Tidy's Physiotherapy: Introduction to disease of respiratory system; ed-12. 164-167.
4. Tidy's – physiotherapy. Chronic obstructive airway diseases. edition -12.
5. Aateman, J., et al. (1979). Regional lung

clearance of excessive bronchial secretions during chest physical therapy in patients with chronic airways obstruction. Lancet. I . 294-297.

6. Chevaillier, J. (1992). airways clearance techniques. Presented at sixth Annual North American Cystic Fibrosis Conference, Dallas.
7. Isawa T, Teshima T, Hirano T, Ebina A, Motomiya M, Konno K. Lung clearance mechanisms in obstructive airways disease. J Nucl Med 1984;25:447-54.
8. Bellone A, Lascioli R, Raschi S, et al. Chest physical therapy in patients with an acute excerbation of chronic bronchitis: effectiveness of three methods. Arch Phys Med Rehabil 2000;81:558–60.
9. Cecins NM, Jenkins SC, Pengelley J, Ryan G. The active cycle of breathing techniques-to tip or not to tip? Respir Med 1999;93:660.
10. Bott J, Baudovin SV, Moxham J, Effectiveness of the chest physiotherapy in manual techniques include percussion (chest clapping) over the chest wall and shaking or mechanical vibration, with loosening secretion of cough with expectoration, 1991.
11. McCarren et al, mechanical vibrator techniques used as an airway clearance technique for effectiveness chronic bronchitis, 2003.

STATEMENT ABOUT OWNERSHIP AND OTHER PARTICULARS

"Physiotherapy and Occupational Therapy Journal" (See Rule 8)

1.	Place of Publication	:	Delhi
2.	Periodicity of Publication	:	Quarterly
3.	Printer's Name	:	**Dinesh Kumar Kashyap**
	Nationality	:	Indian
	Address	:	3/259, Trilokpuri, Delhi-91
4.	Publisher's Name	:	**Dinesh Kumar Kashyap**
	Nationality	:	Indian
	Address	:	3/259, Trilokpuri, Delhi-91
5	Editor's Name	:	**Dinesh Kumar Kashyap**
	Nationality	:	Indian
	Address	:	3/259, Trilokpuri, Delhi-91
6.	Name & Address of Individuals	:	**Red Flower Publication Pvt. Ltd.**
	who own the newspaper and particulars of	:	41/48, DSIDC, Pocket-II
	shareholders holding more than one per cent of the total capital		Mayur Vihar, Phase-1, Delhi-91

I, **Dinesh Kumar Kashyap**, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/-

(Dinesh Kumar Kashyap)

Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 1, January - March 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15122.2

The Reliability and Validity of Shoulder Strength Measurements Using a Force Gauge and Strain Gauge in Diabetic Frozen Shoulder Patients

Niraj Kumar[1], Siddhartha Sen[2], Navneet Badoni[3], Anirban Patra[4]

How to cite this article:
Niraj Kumar, Siddhartha Sen, Navneet Badoni, et. al, The Reliability and Validity of Shoulder Strength Measurements Using a Force Gauge and Strain Gauge in Diabetic Frozen Shoulder Patients, Physiotherapy and Occupational Therapy Journal. 2022;15(1):17-22.

ABSTRACT

Purpose/Aim: This study investigated the reliability and validity of shoulder strength measurements using a digital force gauge and strain gauge in diabetic frozen shoulder patients.

Materials/Methods: Digital force gauge and strain gauge to measure shoulder flexion, abduction, internal and external rotation in diabetic frozen shoulder patients.

Results: Excellent intrarater reliability was present with Intraclass Correlation Coefficients (ICC- 3,k) for Force Gauge ≥ 0.95. The concurrent validity Force Gauge was good with ICC (3,k) values of ≥ 0.85. The 95% limits of agreement suggest that the Force Gauge measurement instruments can be expected to strength from 2° to 20°. Digital force gauge flexion, abduction, external rotation and internal rotation measurements had a greater mean and standard deviation than strain gauge flexion, abduction, external rotation and internal rotation measurements.

Conclusions: This investigation is the first of its kind to evaluate the reliability and concurrent validity of strain gauge and force gauge measurements of muscles strength of shoulder flexion, abduction, external and internal rotation. When used with the measurement procedures outlined in this investigation, both techniques are reliable, as evidenced by reliability coefficients that exceed 0.90 (the threshold recommended for making clinical decisions). Good concurrent validity statistics were produced; however, one should recognize the potential ranges of disagreement between the two measurement instruments used in this study. When monitoring or comparing static shoulder strength measurements both researchers and clinicians should consider using similar instruments.

Keywords: Diabetic Frozen Shoulder Patients; Lutron Force Gauge; Reliability; Shoulder Validity.

Author Affiliation:
[1]Ph.D. Scholar Physiotherapy, [3]Professor, [4]Associate Professor, Department of Orthopedics, Shri Guru Ram Rai Institute of Medical & Health Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand 248121, India, [2]Associate Professor, Faculty of Physiotherapy, SGT University, Gurugram, Haryana 122505, India.

Corresponding Author:
Siddhartha Sen, Associate Professor, Faculty of Physiotherapy, SGT University, Gurugram, Haryana 122505, India.

E-mail: siddhartha.pt@gmail.com

Recieved on 04.01.2022
Accepted on 15.02.2022

INTRODUCTION

The term "frozen shoulder" was first introduced by Codman in 1934. He described a painful shoulder condition of insidious onset that was associated with stiffness and difficulty sleeping on the affected side. Codman also identified the marked reduction in forward elevation and external rotation that are the hallmarks of the disease. Long before Codman, in 1872, the same condition had already been labelled "periarthritis" by Duplay. In 1945, Naviesar coined the term "adhesive capsulitis."[1]

Frozen shoulder (FS), is painful and debilitating characterized by pain on sudden movement, and a passiverestriction to range of movement, particularly of externalrotation of the shoulder, it is often misdiagnosed. FS, particularly in diabetics, is difficult to treat. There is currently no consensus in the management of diabetic FS,

© Red Flower Publication Pvt. Ltd.

The incidence of FS is between 3 and 5% and is considerably higher in diabetic patients, up to 30%, with a tendency to more severe symptoms and resistance to treatment. It most commonly affects patients in middle age and affects women slightly more than men. Frozen shoulder can be secondary to trauma and is associated with Dupuytren's contracture, Peyronie's disease and other connective tissue disorders. Post-operative FS has been reported in up to 11% of patients undergoing arthroscopy, with diabetes being a predictor for this post- operative complication.

In order to account for the higher rates of FS associated with diabetes mellitus, it has been suggested that higher systemic glucose concentrations result in faster glycosylation, resulting in increased rates of FS and other soft tissue disorders, such as Dupuytren's disease. Higher HBA1C is associated with development of FS indiabetic patients.

Arthroscopic biopsies of synovium in diabetic patients demonstrate greater endothelial growth factors compared with non-diabetic FS and reduced inflammatory growth factors, including ADAMTS-4, MMO-1 and particularly M-CSF. The latter mayaccount for slowing of the inflammatory response, therefore prolonging and increasing the severity of the disease. Some studies, however, have shown little difference in inflammatory markers compared to non-diabetic patients. It should be noted that studies using arthroscopic biopsies are only sampling more severe and intractable cases of FS, which require surgery.[2]

Frozen shoulder has been associated with a number ofsystemic conditions, including diabetes mellitus; indeed, the incidence of frozen shoulder amongst diabetic individuals is 10% to 36%, which is significantly greater thanthe 2% to 5% rate in the general population. Management options for frozen shoulder include simple analgesia, physiotherapy, local anesthetic and corticosteroid injection, hydrodilatation, manipulation under general anaesthesia (MUA), arthroscopic release, and even opensurgical release.[4] Advocates of each approach have published supporting results in the general population; however, it is uncertain which strategy is best in diabeticpatients, where the natural history of the condition is protracted and patients tend to respond less well to conservative or interventional treatment.[3]

A force gauge is a measuring instrument used to measure forces. There are two kinds of force gauges today: mechanical and digital force gauges. Force Gauges usually measure pressure in stress increments and other dependent human factors. A common mechanical force scale, known as the spring scale, features a hook and a spring that attach to an object and measure the amount of force exerted on the spring in order to extend it.[5]

Design

Participants

Ten diabetic frozen shoulder patients'adult participants, 7 males and 3 females, were recruited from a Shri Mahant Indiresh Hospital, Department of Physiotherapy, Patel Nagar, Dehradun (Uttarakhand) setting. Participants who met study requirements were provided with an informed consent document approved by the Synopsis Approval Committee (SAC) of SGRR University and Institutional Ethics Committee of Shri Guru Ram Rai Institute of Medical & Health Sciences, Patel Nagar, Dehradun and all questions were answered to their satisfaction prior to commencing data collection.. Exclusion criteria consisted of reported cervical spine or upper extremity pain at the time of data collection or recent shoulder surgery on the dominant arm for which the subject was still receiving care.

INSTRUMENTATIONS

Lutron Force Gauge is an Electronic Force Gauge Included Components Force Gauge (20 Kg) Made in Taiwan. It's having Tension & Compression Capability. LutronForce Gauge has 3 Kind Display Unit, Kg/lb/Newton and Peak Hold (Max. Load) Measurement. Its Model Number FG-20 KG and Power Source Type is Battery Powered. The item weight 300 grams and manufacturer series number M:7980752747. Measurement Accuracy +/-0.5%. Specification Met ISO 9001:2015, CE, IEC 6010. Digital force gauges are the most popular form of measurement used to calculate force. Measured in Newtons, it's best to use a gauge at 20-80% of its capacity.

Procedures

Measurement of Muscle Strength

Muscle strength, defined as the maximal voluntary force that subjects were able to exert under specified testing conditions, was measured using Lutron

Force Gauge, which is made in Taiwan. Subjects were tested in standing for flexion, abduction and in sitting for external and internal rotation. Lutron Force Gaugeis attached to a stationary device stabilized at the edge of a portable examination table.

Proper Care is taken not to allow subjects to use other part of the body for thedesired movement. Patients were given total verbal encouragement during measurement. Maximum effort is used to perform the test, in which a subject exerted a maximal isometric force against the Lutron Force Gaugefor two to four seconds. We, therefore, calculated muscle strength deficits by a force gauge. This calculation, when multiplied by 0.05 N, is a percentage of muscle strength deficit value.

4:11:3:1 Flexor Strength: The patient were standing position and Lutron Force Gaugeattached with edge of examination table. The patient was positioned standing straight with back facing towards the Lutron Force Gaugethen, ask the subject to pull the chain forward away from the body. The test was performed in against gravity plain (Fig. 1)

Fig. 1: Isometric Shoulder Flexion Strength Measurement by Lutron Force Gauge.

4:11:3:2 Abductor Strength: Position of the patients were standing andLutronForce Gauge fixed with treatment table. One end of the strap attached with Lutron Force Gauge and other with distal arm. And then pressed the button zero, told the patient to pull the strap away from the body.

4:11:3:3 Internal Rotator Strength: The patients weresittingpositionedonthechairwith their arm beside their trunk, their shoulder in neutral rotation, their elbow at 90 degrees of flexion, their forearm in neutral supination, and their arm and shoulder stabilized as required. LutronForce Gauge fixed with treatment table and one end of strap attached with LutronForce Gauge and other with distal forearm that must be perpendicular to the floor. And then pressed the button zero, told the patient to apply force towards the trunk. (Fig. 2)

Fig. 2: Isometric Shoulder Abduction Strength Measure -ment by Lutron Force Gauge.

4:11:3:4 External rotator strength: The patients were sitting positioned on the chair with their arm beside their trunk, their shoulder in neutral rotation, their elbow at 90 degrees of flexion, their forearm in neutral supination, and their arm and shoulder stabilized as required. LutronForce Gauge fixed with treatment table and one end of strap attached with LutronForce Gauge and other with distal forearm, that must be perpendicular to the floor. And then pressed the button zero, told the patient to apply force away from the trunk.[89 & 90](Fig. 3)

Fig. 3: Isometric Shoulder Flexion Strength Measurement by Lutron Force Gauge.

Table 1: Subject Position, Placement of Force Gauge, Provided for Each Tested Muscle Action.

Muscle Action	Limb/Joint Positions	Subject position	Force Gauge Placement
Flexion	Flexion at 0° abduction	Standing	Distal Humerus/ Lateral Epicondyle of Humerus
Abduction	Abduction at 0° abduction	Standing	Distal Humerus/ Lateral Epicondyle of Humerus
External Rotation	Shoulder 90° abduction + Elbow 90° Flexion	Sitting	Distal Forearm/ Above wrist
Internal Rotation	Shoulder 90° abduction + Elbow 90° Flexion	Sitting	Distal Forearm/ Above wrist

STATISTICAL METHODS

Data analysis was performed with SPSS version 15.0 for Windows. Descriptive data including mean measurement angles with standard deviations (SD) were calculated for each session. The intrarater reliability was determined by the ICC Model 3, k. The mean value from each testing session was used for the analysis. Model 3, k was used for the intrarater analysis because the specific rater was the only tester of interest.[10,11] Interpretation of ICC values was based on guidelines offered by Portney and Watkins, 10 where a value above 0.75 was classified as good reliability. ICC values may be influenced by inter subject variability of scores, because a large ICC may be reported despite poor trial-to-trial consistency if the intersubject variability is too high.[10,12] The standard error of measurement (SEM) is not affected by intersubject variability.[12] Therefore, SEM was reported in conjunction with the ICC's using the formula: SEM = SD 1− r. 10 An ICC Model 3, k was used in the concurrent reliability analysis to determine if both methods of measurement analysis produced comparable results. ICC value interpretations were based on the aforementioned guidelines established by Portney and Watkins.[10] The 95% limits of agreement (LOA) were calculated using the formula: 95% limits of agreement = mean difference +/- 2SD.10

RESULTS

Descriptive data, including the mean and SD for each of the four measurements are presented in Table 1. Intrarater analysis suggested excellent reliability for all measurements with both instruments ranging from, ICC (3, k) = 0.94-0.98. There was a trend for higher reliability with the inclinometric measurements when compared to goniometry. Measurement data from the intrarater reliability analysis including the ICC, 95% CI and SEM are presented in Table 2**.**

Table 2: Descriptive Measurement Data

	Flexion Mean °(SD)	Abduction Mean °(SD)	External Rotation Mean °(SD)	Internal Rotation Mean °(SD)
Strain Gauge	156 (9)	161 (11)	92 (10)	48 (10)
Force Gauge	164 (9)	162 (11)	100 (11)	49 (11)

SD= Standard Deviation;

The concurrent validity between goniometry and digital inclinometry measurements are presented in Table 3.

Table 3: Descriptive Measurement Data. Intrarater Reliability of Strain Gauge and Digital Force Gauge.

	Flexion	Abduction	External Rotation	Internal Rotation
Strain Gauge ICC (95% C1) SEM	0.95(0.89-0.98)2	0.97(0.94-0.99)2	0.94(0.87-0.97)3	0.95(0.89-0.98)2
Force Gauge ICC (95% C1) SEM	0.95(0.90-0.98)2	0.97(0.94-0.98)2	0.98(0.96-0.99)2	0.97(0.93-0.98)2

ICC=Intraclass coefficient; SEM=Standard error of measurement rounded to nearest degree; CI= Confidence interval ;

When comparing the mean end-range angles for the instruments a trend existed for lower goniometric values of flexion, abduction and external rotation compared to inclinometry. The mean goniometric value of internal rotation, however, was greater than the mean inclinometric value. In regards to agreement the 95% LOA suggests that goniometry may range from being 20° less than to 5° greater than inclinometry when measuring flexion. The 95% LOA suggests that goniometric abduction may range from 17° less than to 14° greater than inclinometry. Goniometric external rotation may range from 2-16° less than inclinometry, whereas internal rotation measurements ranged from 3- 15° greater than inclinometry.

Excellent intrarater reliability was present with Intraclass Correlation Coefficients (ICC 3,k) for LutronForce Gauge ≥ 0.95. The concurrent validity Lutron Force Gauge was good with ICC (3,k) values of ≥ 0.85. The 95% limits of agreement suggest that the Lutron Force Gauge measurement instruments can be expected to strength from 2° to 20°.

DISCUSSION

When adhering to the procedures outlined in this investigation, measurements taken using both the inclinometer and goniometer possessed good intrarater reliability. The reliability results are comparable to previous research which has reported the good to excellent intrarater reliability when utilizing similar measurement procedures.[8] In regards to concurrent validity, measurements with a digital inclinometer were found to be comparable to those taken with the standard 12 inch plastic goniometer with ICC values ≥ 0.85. Also, there was a trend for inclinometric measurements being greater than goniometry for flexion, abduction and external rotation. In contrast, goniometric internal rotation measurements had a greater mean measurement angle than inclinometry. The mean differences in measurements between the instruments were the greatest for external rotation and flexion and had the narrowest range for abduction. There was no identifiable systematic error in technique that could explain the differences. One might surmise that Rater A (who took all goniometric measurements) was biased toward lower angles, however, internal rotation was higher from Rater A which challenges that assumption. Furthermore, the landmarks for measurements are different which may produce different end-ranges and should be of concern to clinicians. Unfortunately, no studies have established the validity of these instruments concurrently with radiography to determine which one might offer a more valid estimate of mobility. Clinicians and researchers should recognize that the difference between these two measurement instruments can be expected to vary by 2°-20° with differences dependent upon the movement being measured. From a clinical perspective this cannot be overlooked as the upper range of disagreement at 20 degrees may lead to differences in both diagnosis and the plan or care particularly as related to interventions designed to improve mobility. Only two previous studies have investigated the concurrent validity of similar

instruments for measuring shoulder function. One study investigated the concurrent validity of scapular plane elevation using similar instruments to this investigation.[13] In the aforementioned study the concurrent validity was good with an ICC value of 0.94 and the 95% LOA suggesting that the difference between these two measurement instruments can be expected to vary by up to +/-11°. Another study investigated the concurrent validity of goniometry and a construction grade digital level and reported ICC values of non-involved (asymptomatic) to involved (symptomatic) shoulder motions of flexion, ER and IR.14 In the aforementioned study the concurrent validity was reported to range from ICC = 0.71-0.98 for both non-involved and symptomatic shoulders. For shoulder flexion the ICC ranged from 0.91-0.95 for the involved shoulder compared to 0.81-0.86 for the uninvolved. ER ranged from 0.91-0.96 (involved) to 0.71- 0.94 (uninvolved) whereas IR ranged from 0.82-0.96 (involved) to 0.83-0.93 (uninvolved).[14] While the aforementioned study offers insight into the interchangeability, the construction grade digital level may not be comparable to traditional inclinometers such as the one used in this investigation. This study was the first to analyze the concurrent validity of goniometric and digital inclinometric measurements of shoulder mobility. Due to the lack of research in this area, a comparison between the current study and previous research cannot be made. However, this study does set the groundwork for further research in this area in order to evaluate the interchangeability of goniometric and digital inclinometric measurements.

Limitations and Future Research

When interpreting the reliability values in our investigation, one must recognize that the consistency of AROM in individuals with healthy shoulders may not correlate with those who have shoulder pathology. Triffitt et al.[15] assessed the reproducibility limits of inclinometric shoulder abduction and external rotation in both symptomatic and asymptomatic subjects. Asymptomatic subjects had a difference ranging from 24 to 33° for all measurements as compared to 24 to 41° in symptomatic subjects, suggesting a greater variance among those with a painful shoulder. While the authors of the current study cannot state with certainly that this would be the case with all testers and procedures it is an issue requiring consideration.

CONCLUSIONS

The results cautiously support the interchangeable use of Lutron Force Gauge for measuring shoulder strength measurements. Although reliable, clinicians should consider the 95% limits of agreement when using these instruments interchangeably as clinically significant differences are likely to be present.

Level of evidence: 2b

REFERENCES

1. Richard Dias, Steven Cutts and Samir Massoud (2005). Frozen shoulder Richard. BMJ Volume-331 17 bmj.com.PP-1453-1456.

2. Emily F. Jenkins, William J.C. Thomas, John P. Corcoran, Ravisankar Kirubanandan Celia R. Beynon, Adrian E. Sayers, David A. Woods, (2012) The outcome of manipulation under general anesthesia for the management of frozen shoulder in patients with diabetes mellitus21, PP1492-1498. Journal of Shoulder and Elbow Surgery Board of Trustees. doi:10.1016/j.jse.2011.11.006.

3. Cintia Garcilazo, Javier A. Cavallasca and Jorge L. Musuruana, Shoulder Manifestations of Diabetes Mellitus, Volume 6 , Issue 5 , 2010 Page:-334 - 340 DOI:10.2174/157339910793360824

4. C. Whelton1 C. A. Peac (2017) Review of diabetic frozen shoulder, Eur J OrthopSurgTraumatol DOI 10.1007/s00590-017-2068-8.

5. Cedric X. Bryant. A Commonsense Approach to Addressing Shoulder Instability.

6. PoojaChughAnand, GulshanLal Khanna, VarshaChorsiya and AnkitRana (2017) Relationship between Shoulder Strength and Bowling Speed in Cricket Bowlers, Journal of Exercise Science & Physiotherapy, Vol. 13, No. 1, PP-81-86.

7. P Click Fenter, J W Bellew, T A Pitts, R E Kay (2003) Reliability of stabilised commercial dynamometers for measuring hip abduction strength: a pilot study, Br J Sports Med., Volume-37, PP-331–334.

Physiotherapy and Occupational Therapy Journal

Library Recommendation Form

If you would like to recommend this journal to your library, simply complete the form given 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

Name of Library

Address of Library

Recommended by:

Your Name/ Title

Department

Address

Dear Librarian,

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

1. Useful information for members of my specialty.
2. An excellent research aid.
3. An invaluable student resource.

I have a personal subscription and understand and appreciate the value an institutional subscription would mean to our staff.

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.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091(India)
Phone: 91-11-79695648, Cell: +91-9821671871
E-mail: info@rfppl.co.in

SUBSCRIPTION FORM

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

Subscription Rates:
• Institutional: **INR 9500/USD 742**

Name and complete address (in capitals):_____

_____

Payment detail:
Online payment link: http://rfppl.co.in/payment.php?mid=15

Cheque/DD: Please send the US dollar check from outside India and INR check from India made payable to 'Red Flower Publication Private Limited'. Drawn on Delhi branch.

Wire transfer/NEFT/RTGS:
Complete Bank Account No. 604320110000467
Beneficiary Name: Red Flower Publication Pvt. Ltd.
Bank & Branch Name: Bank of India; Mayur Vihar
MICR Code: 110013045
Branch Code: 6043
IFSC Code: BKID0006043 (used for RTGS and NEFT transactions)
Swift Code: BKIDINBBDOS

Term and condition for supply of journals
1. Advance payment required by Demand Draft payable to **Red Flower Publication Pvt. Ltd**. payable at **Delhi.**
2. Cancellation not allowed except for duplicate payment.
3. Agents allowed 12.5% discount.
4. Claim must be made within six months from issue date.

Mail all orders to
Subscription and Marketing Manager
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091(India)
Phone: 91-11-79695648, Cell: +91-9821671871
E-mail: sales@rfppl.co.in

Original Article

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 1, January - March 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15122.3

Prevalence and Incidence of Upper Cross Syndrome in Paramedical Students Due to Electrical Learning: Cross Sectional Study

Amit S Patel[1], Zankhna D Patel[2], Twinkle N Chudgar[3], Jahnvi A Tailor[4], Naresh R Ray[5]

How to cite this article:
Amit S Patel, Zankhna D Patel, Twinkle N Chudgar, et. al., Prevalence and Incidence of Upper Cross Syndrome in Paramedical Students Due to Electrical Learning: Cross Sectional Study, Physiotherapy and Occupational Therapy Journal. 2022;15(1):25-30.

ABSTRACT

Background: Upper cross syndrome (UCS) refers to specific altered muscles activation and changed movement pattern along with some postural deviation in the upper quarter of the body. This syndrome contributes to the dysfunction of Craniovertebral angle, kyphotic angle, C7 shoulder angle, Deep flexor strength and Pectoralis minor length.

Purpose of the Study: The aim of study is to evaluate the prevalence and incidence of the upper cross syndrome among the paramedical students due to electrical learning.

Objective: This study shows the Prevalence and Incidence of the Upper Cross Syndrome among the various paramedical students of south Gujarat region due to electrical learning during this pandemic period.

Subjects and Method: The cross sectional study with 121 samples was with age of 18-22 years. With minimum online study duration of 2hrs.

Statistical Analysis Used: The data analysis was done by the Microsoft excel version and Acrobat reader.

Result: The result shows that the prevalence and incidence of UCS in paramedical students is 63% the prevalence of UCS in male was 15% and in female was 85%. The prevalence of UCS in nursing students was 29%, physiotherapy students was 62%, optometry 9%.

Conclusion: During this pandemic high prevalence of upper cross syndrome in paramedical students was found . It has been concluded that more use of electrical gadget can lead to adaptation of poor posture and so lead to upper cross syndrome. The results of the study suggest focusing more on postural awareness and proper use of electrical device in paramedical students.

Keywords: Upper cross syndrome; Prevalence; Electrical learning.

Author Affiliation:
[1]Principal, [2]Assistant Professor, [3-5]Intern, Department of Physiotherapy, M. B. Gohil Instiitute of Medical Science and Research Center, College of Physiotherapy, Navsari 396445, Gujarat, India.

Corresponding Author:
Zankhna D Patel, Assistant Professor, Department of Physiotherapy, M. B. Gohil Instiitute of Medical Science and Research Center, College of Physiotherapy, Navsari 396445, Gujarat, India.

E-mail: PateKavita567@gmail.com

Recieved on 12.01.2022
Accepted on 08.03.2022

INTRODUCTION

Upper Cross Syndrome is the common postural dysfunctional pattern that describes the dysfunctional tone of the musculature of shoulder girdle / Cervicothoracic region of the body. The condition is given the name "X" in other words a cross, can be drawn across the upper body. One arm of cross the indicates the muscle that are typically tight and other arm shows the muscle that are typically weak.[4]

Upper Cross Syndrome is caused by weak lower and middle Trapezius, tight Upper Trapezius and Levator scapulae, weak Deep Neck Flexors, tight Subocciptal muscles and Sternocleidomastoid, weak Serratus anterior and tight Pectoralis Major and Minor. The syndrome arises as a result of muscular imbalance that usually develops because of tonic and weak muscle.

Individual present with Upper Cross Syndrome will show Forward Head Posture, hunching to thoracic spine, elevated and protracted

© Red Flower Publication Pvt. Ltd.

shoulder, scapular winging and decreased mobility of thoracic spine. The simultaneous occurrence of Forward Head Posture and rounded shoulder is nothing but Upper Cross Syndrome. One of the most common postural problems is forward head posture (FHP). Change in the posture at cervical region due to prolong use of electrical gadgets like Mobile phone, Laptops, Computer during their online classes in pandemic time lead to imbalance in musculature and restrict their daily activities.[2]

Due to this pandemic period, there has been increase in the use of the electronic gadgets for online studies which can lead to increase in the Incidence & Prevalence of the Upper Cross Syndrome and its complaints. Hence the study evaluate the postural deviation due to the Upper Cross Syndrome like forward head posture, rounded shoulder & kyphotic posture in order to find out the Upper Cross Syndrome.[6]

The point where lines (perpendicular to the skin surface) produced through T12 and C7 markers intersects each other forms the thoracic flexion angle.A horizontal line passing through the lateral shoulder meets the line drawn from C7 to the lateral shoulder; the point of intersection forms the sagittal shoulder C7 angle. Pressure biofeedback technique was used for measurement of deep neck flexor strength. Participant in a supine position, no pillow was used under the head, pressure biofeedback kept under the cervical region, pressure increased by 20mmhg and asked participants to pressed the neck and 3 readings were taken and average of three noted.1 The investigation involves measuring of the linear distance from the treatment table to the posterior aspect of the acromion in subjects. Subjects were requested to lie supine on a standard treatment table and adopt their natural relaxed posture.[9]

METHODOLOGY

- **Study design:** Cross sectional study
- **Study population:** Paramedical students of South Gujarat region
- **Sampling technique:** Convenient sampling
- **Sample size:** 121 samples (Time bound)
- **Study duration:** 6 months
- **Source of data collection:** From various paramedical colleges of south Gujarat.

Tools and Material used

- Pen & paper
- Digital camera
- Tripod
- Consent form
- Acrobat software
- Measuring tape
- Plinth
- Towel
- Micro pore
- Sphygmomanometer

Inclusion Criteria

- Age – 18 to 22 years
- Paramedical students of Physiotherapy, Optometry, BSC. Nursing, Pharmacy, DMLT/PGDMLT.
- Who are willing to participate.
- Students with or without neck pain, headache, tightness and pain in upper back since last 6 to 7 months.
- Online study duration – minimum 2 hours.

Exclusion Criteria

- Student with recent trauma of cervical region.
- Congenital abnormalities of cervical region.
- Any malignancy related to soft tissue and joints.
- Who have under gone any previous surgeries in cervical region .
- Phone use more than 6 to 8 hours.
- Height greater than 6 feet.

The study was done among 121 paramedical students of different fields, from which 110 were included in our study according to inclusion and exclusion criteria. From 110 students 15(14%) male and 95(86%) female and 68(62%) physiotherapies, 10(9%) optometry, 32(29%) nursing. From 110 students 43(39.44%) are positive for Upper Cross Syndrome.

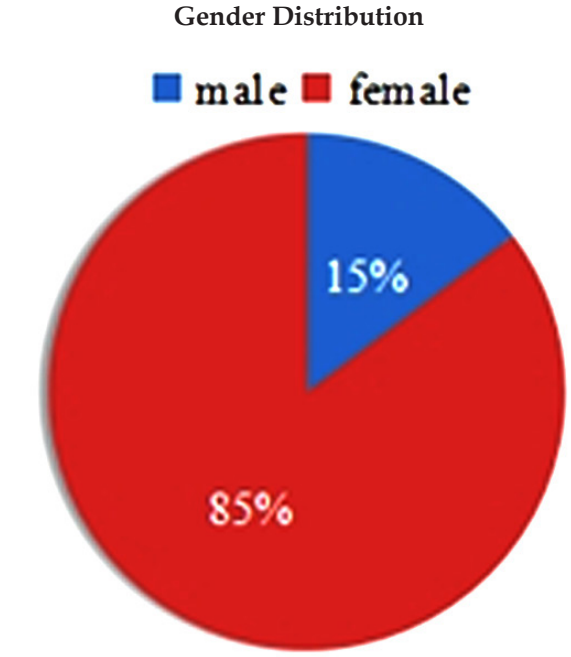
Table 1: Distribution of Participants on the Basis of Gender and Fields.

Field	Male	Female	Total
Physiotherapy	9	59	68
Nursing	3	29	32
Optometry	3	7	10
Total	15	95	110

Table 1 shows all 110 participants with Upper Cross Syndrome on the basis of their gender and field, in which 15 were male and 95 were female.

Shows all 110 participants with Upper Cross

Syndrome on the basis of their gender, in which 15 were male and 95 were female.

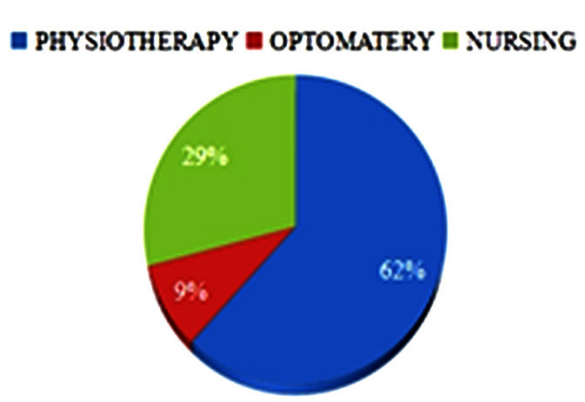


Graph 1: Distribution According to Male\Female Participants.

Table 2: Distribution on the Basis of Field

Field	Students
Physiotherapy	68
Optomatery	10
Nursing	32

Table 2 shows total number of participants on the basis of field, in which 68 are of physiotherapy, 10 are of optometry and 32 are of nursing.



Graph 2: Distribution According to Field.

Table 3: Distribution of Participants on the Basis of all Five Parameters.

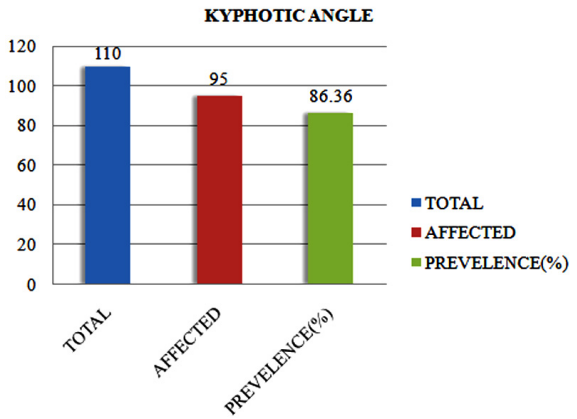
Parameters	Affected Value	Mean Value
Craniovertebral Angle	<50°	55.3°
C7 Shoulder Angle	<52°	44.39°
Kyphotic Angle	>49°	51.2°
Deep Flexor Strength	<26 mmHg	29.06mmHg
Pectoralis Minor Length	<2.6cm	2.91cm

Table 3 shows all five parameter with their normal and mean values.

Table 4: Prevalence of Kyphotic Angle.

Total	Affected	Prevelence (%)
110	95	86.36

Table 4 shows the Prevalence of Kyphotic angle 86.36% in which total sample size is 110 in which affected samples are 95.



Graph 3: Distribution of Kyphotic Angle.

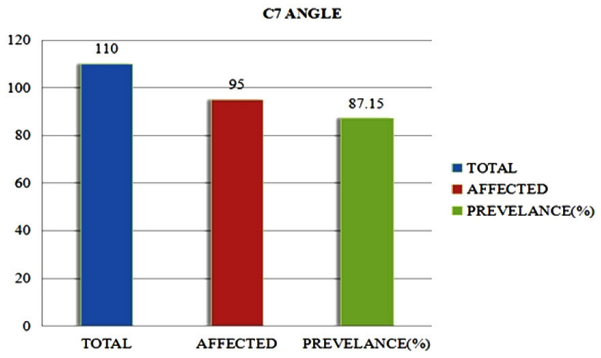
Shows the Prevalence of Kyphotic angle in which the total sample size is 110 in which affected samples are 95 with Prevalence of 86.36%.

Table 5: Prevalence of C7 Angle.

Total	Affected	Prevelance (%)
110	95	86.36

Table 5 shows the Prevalence of C7 angle 86.36% in which total sample size is 110 in which affected samples are 95.

Shows the Prevalence of C7 angle in which the total sample size is 110 in which affected samples are 95 with prevalence of 86.36%.

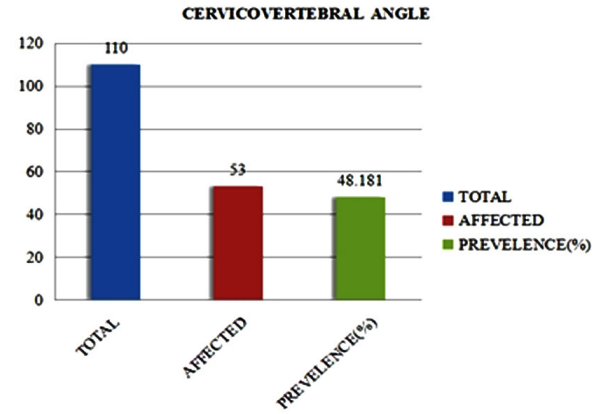


Graph 4: Distribution of C7 Angle.

Table 6: Prevalence of Cervicovertebral Angle

Total	Affected	Prevelence (%)
110	53	48.181

Table 6 shows the Prevalence of Cervico-vertebral angle 48.181% in which total sample size is 110 in which affected samples are 53.

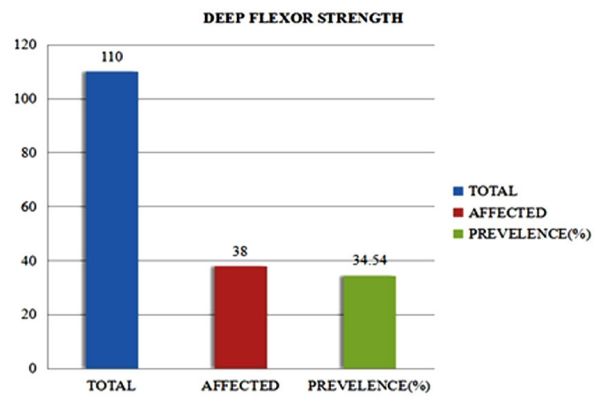


Graph 5: Distribution of Cervicovertebral Angle.

Table 7: Prevalence of Deep Flexor Strength.

Total	Affected	Prevelence (%)
110	38	34.54

Table 7 shows the Prevalence of Deep Flexor strength 34.54% in which total sample size is 110 in which affected samples are 38.



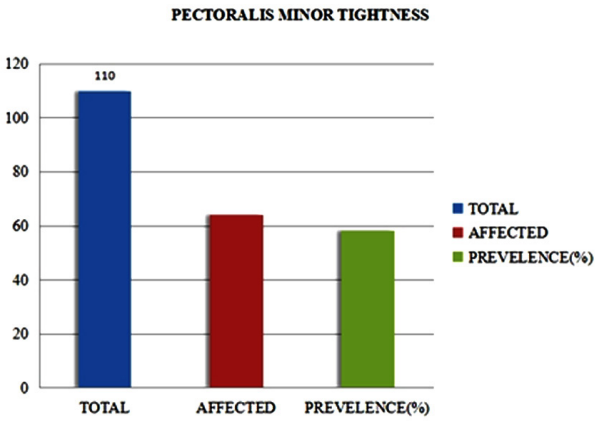
Graph 6: Distribution of Deep Flexor Strength

Shows the Prevalence of Deep Flexor Strength angle in which the total sample size is 110 in which affected samples are 38 with Prevalence of 34.54%.

Table 8: Prevalence of Pectoralis Minor Tightness.

Total	Affected	Prevelence (%)
110	64	58.18

Table 8 shows the Prevalence of Pectoralis minor tightness 58.18% in which total sample size is 110 in which affected samples are 64.



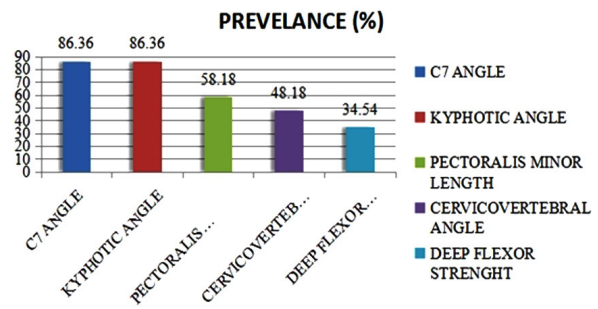
Graph 7: Distribution of Pectoralis Minor Length.

Shows the Prevalence of Pectoralis minor tightness 58.18% in which total sample size is 110 in which affected samples are 64.

Table 9: Prevalence of All Parameters.

Upper cross syndrome	Prevelance (%)
C7 angle	86.36
Kyphotic angle	86.36
Pectoralis minor tightness	58.18
Cervicovertebral angle	48.18
Deep flexor strenght	34.54

Table 9 shows the Prevalence of all five parameters of Upper Cross Syndrome which is C7 angle, Kyphotic angle, Pectoralis minor tightness, Cervico-vertebral angle, Deep flexor strength.



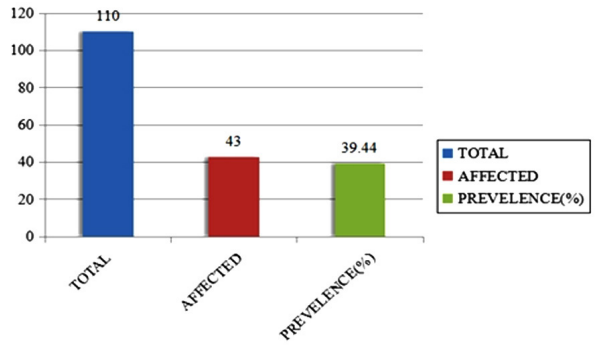
Graph 8: Prevalence of All Paremeter.

Shows the Prevalence of all five parameters of Upper Cross Syndrome which are C7 angle, Kyphotic angle, Pectoralis minor tightness, Cervico-vertebral angle, Deep flexor strength.

Table 10: Prevelence of Upper Cross Syndrome.

Total	Affected	Prevelence (%)
110	43	39.44

Table 10 shows Prevalence of Upper Cross Syndrome in which total Prevalence is 39.44% and affected data are 43.



Graph 9: Prevelnce of Upper Cross Syndrome

Shows Prevalence of Upper Cross Syndrome in which total Prevalence is 39.44% and affected data are 43.

DISCUSSION

In the current study we found that the Prevalence of Upper Crossed Syndrome paramedical college students are 39.44%. The Prevalence of upper crossed syndrome in male was 14% and in female was 86%. The Prevalence of Upper Crossed Syndrome in nursing students was 29%, in physiotherapy student was 62%, and in optometry students was 9%. The prevalence of Cranio-vertebral angle found was 48.18%, C7 angle was 86.36%, Kyphotic angle was 86.36%, Deep Flexor strength was 34.53% and Pectoralis Minor length was 58.18.

The study duration was 0-2hrs and the students were.[14] The study duration was 2-4hrs and the students were 33, the study duration was 4-6hrs and the students were 63 and the study duration was 6-8hrs and the students were 0. Our study shows that students who attended classes for 4-6hrs are more prone to have Upper Cross Syndrome. Dr. Pooja Dhage, Dr. Deepak Anap et.al. Studied in 2019 that the Prevalence of Upper Cross Syndrome in physiotherapy students was 30.43%. Bad postural habit is one of the common reasons for this.[1]

This flexed neck posture can increase the moment of the cervical spine and induce muscle strain in adjacent portions of the cervical spine.12Various disorders of cervical region like–Upper Cross Syndrome, cervical spondylosis kyphotic posture, prolapsed intervertebral disc and scoliosis can affect the surrounding musculature leading to postural changes in cervical region.[1]

Upper crossed syndrome is caused by musculature imbalance that usually develops between tonic and weak muscles. Individuals who present with upper crossed syndrome will show forward head–and-neck posture. Study shows that many paramedical students are having postural alterations.[3]

Due to this pandemic period all the students are at home and the use of electronic gadget has increased. Students spend more time using smart phone, tablets, and laptops in call, text e-reading and using social media. It is responsible for neck and shoulder pain and headache.[5]

Student may use Smartphone's with the head shifted forward and the smart phone placed near the waist or lap while in a sitting position. This flexed neck posture can increase the moment of the cervical spine and induce muscle strain in adjacent portions of the cervical spine which may cause permanent damage to their cervical spines that could lead to lifelong neck pain.

Long term use of electronic gadget causes muscular imbalance and can lead to increase in kyphotic angle. As the result 58.18% students have increased kyphotic angle.

Prospective associations were found between text messaging on mobile phones and musculoskeletal disorders. The results imply mostly short-term effects, and to a lesser extent, long-term effects on musculoskeletal disorders in neck and upper extremities.[1]

CONCLUSION

During this pandemic high prevalence of upper cross syndrome in paramedical students was found. It has been concluded that more use of electrical gadget can lead to adaptation of poor posture and so lead to upper cross syndrome. The results of the study suggest focusing more on postural awareness and proper use of electrical device in paramedical students.

REFERENCES

1. Dr. pooja Dhage, Dr. Deepak Anap. Prevalence of an Upper Crossed Syndrome in Physiotherapy College Students–A Cross-Sectional study, March 2019.
2. Chaudary AA, Aslam F, Ali A, Asghar AR, Bashir H, Awais A et al. Frequency of Text Neck Syndrome in Medical Students due to Excessive Usage of Electronic Devices J Pak Orthop Assoc ,September 2019.
3. Junaid Chandsaheb Mujawar and javid hussain sagar et al. Prevalence of Upper Cross Syndrome in Laundry Workers, Indian journal of environment med, jan- apr 2019.
4. Dalia Marčiulionytė, Algė Daunoravičienė, Aurelijus Domeika, Milda Dubosienė et al. Athletes and non-athletes adolescents' use of smart phones duration, habits and relationship between the Upper Cross Syndrome, august 2019.
5. Asad Ali Chaudary, Farjad Aslam, Arfa Ali, Arshman Rauf Asghar, Hamza Bashir, Arfa Awais, Ch. Zaid Riaz, Bismah Riaz , Maj. Gen® Ch. Ahmed < Brig® Dr. Shahid Majeed, Amna Shahab, Mudassar et. Al. frequency of Text Neck Syndrome in Medical Students Due to Excessive usage of Electronic Devices 2019.
6. Deepika Singla, Zubia Veqar and Mohammed Ejaz Hussain et al, Photogrammetric Assessment of Upper Body Posture Using Postural Angles: A Literature Review, January 24, 2017.
7. Arun V. Subbarayalu and Mariam A. Ameer et al, Relationships among head posture, pain intensity, disability and deep cervical flexor muscle performance in subjects with postural neck pain, August 2017.
8. Bader K AlZarea, Santosh R Patil et al, Mobile Phone Head and Neck Pain Syndrome: Proposal of a New Entity, October, 2015.
9. Jeremy S Lewis and Rachel E Valentine et al, The pectoralis minor length test: a study of the intra-rater reliability and diagnostic accuracy in subjects with and without shoulder Symptoms, july 2007.
10. Chris Ho Ting Yip, Thomas tai wing chiu, Anthony Tung Kuen Poon et al, The relationship between head posture and severity and disability of patients with neck pain, march 2007.
11. Iqra Mubeen, Salman Malik, Waseem Akhtar, Muneeb Iqbal, Muhammad Asif, Adil Arshad, Sobia Zia, Saifullah Khalid et al, Prevalence of Upper Cross Syndrome among the medical students of university of lahor, june 2016.
12. Kim MS. Influence of neck pain on cervical movement in the sagittal plane during smartphone use. Journal of physical therapy science. 2015; 27(1):15-7.
13. Kataria J. Text Neck-Its Effects on Posture. International Journal of Creative Research Thoughts. 2018; 6(1):817-9.
14. Gustafsson E, Thomée S, Grimby-Ekman A, Hagberg M. Texting on mobile phones and musculoskeletal disorders in young adults: a five-year cohort study. Applied ergonomics. 2017 Jan 1; 58:208-14.
15. Surendra Babu Darivemula, Kiran Goswami, Sanjeev Kumar Gupta, Harshal Salve, Upinder Singh,1 and Anil Kumar Goswami study on work related neck pain (WRNP) among desk job workers for tertiary care hospital in new Delhi, India. 2016 jan.-march 41(1):50-54.

REDKART.NET

(A product of Red Flower Publication (P) Limited)
(Publications available for purchase: Journals, Books, Articles and Single issues)
(Date range: 1967 to till date)

The Red Kart is an e-commerce and is a product of Red Flower Publication (P) Limited. It covers a broad range of journals, Books, Articles, Single issues (print & Online-PDF) in English and Hindi languages. All these publications are in stock for immediate shipping and online access in case of online.

Benefits of shopping online are better than conventional way of buying.

1. Convenience.
2. Better prices.
3. More variety.
4. Fewer expenses.
5. No crowds.
6. Less compulsive shopping.
7. Buying old or unused items at lower prices.
8. Discreet purchases are easier.

URL: www.redkart.net

Instructions to Authors

Submission to the journal must comply with the Guidelines for Authors. Non-compliant submission will be returned to the author for correction.

To access the online submission system and for the most up-to-date version of the Guide for Authors please visit:

http://www.rfppl.co.in

Technical problems or general questions on publishing with **POTJ** are supported by Red Flower Publication Pvt. Ltd.'s Author Support team (http://rfppl.co.in/article_submission_system.php?mid=5#)

Alternatively, please contact the Journal's Editorial Office for further assistance.

Editorial Manager
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091(India).
Mobile: 9821671871, Phone: 91-11-79695648
E-mail: author@rfppl.co.in

Case Report

Physiotherapy and Occupational Therapy Journal
Volume 15 Number 1, January - March 2022
DOI: http://dx.doi.org/10.21088/potj.0974.5777.15122.4

Effect of Instrument Assisted Soft Tissue Mobilisation for the Management of Acute Shin Splints: A Case Report

Manisha Uttam

How to cite this article:
Manisha Uttam/Effect of Instrument Assisted Soft Tissue Mobilisation for the Management of Acute Shin Splints: A Case Report, Physiotherapy and Occupational Therapy Journal. 2022;15(1):33-36.

ABSTRACT

Shin Splints is characterized by lower leg pain and tenderness in the middle or lower third of the medial edge of the shinbone.

Objective: The purpose of this case report is to evaluate the effect of Instrument Assisted Soft tissue Mobilisation (IASTM) along with conventional rehabilitation programme for the management of Acute Shin Splints.

Clinical Features: A 63 year old male patient complains of pain in his left lower leg since one week. On palpation, tenderness was present on anterior, medial and posterior side of tibia. Initially symptoms were mild during walking but later his pain gets severe even with weight bearing. The patient underwent treatment of Instrument Assisted Soft tissue Mobilisation and conventional rehabilitation for one week.

Intervention and Outcome: The recovery of pain was monitored by visual analogue scale and muscle strength by manual muscle testing. On Visual Analog Scale (VAS), Pain on rest was 3 while on weight bearing it was 8 out of 10. Left lower extremity muscle strength was grade 4 measured by manual muscle testing. After one week, a significant reduction of pain in his left lower leg, VAS gets reduced to 1 on weight bearing and 0 at rest. Lower extremity muscle strength also increased to grade 5. After one week follow up, his symptoms completely resolve.

Conclusion: The study concluded that IASTM showed a promising result in managing the Acute Shin Splints. It should be used as an addition to conventional rehabilitation program.

Keywords: Medial Tibial Stress Syndrome; Soft tissue mobilization; Acute pain; Rehabilitation; Lower leg pain.

Author Affiliation:
Director, Golden Touch Physiotherapy, Advance Pain and Paraly Clinic, Amritsar 143001, Punjab, India.

Corresponding Author:
Manisha Uttam, Director, Golden Touch Physiotherapy, Advance Pain and Paraly Clinic, Amritsar 143001, Punjab, India.

E-mail: manisha_uttam1989@rediffmail.com

Recieved on 21.01.2022
Accepted on 24.02.2022

INTRODUCTION

Shin Splints or Medial Tibial Stress Syndrome (MTSS) is an activity induced lower leg pain. It is described as diffuse tenderness over the posterior medial aspect of distal third of tibia.[1] Overall, prevalence of shin splints reported to be 10-15% of running injuries and up to 60% of all leg pain syndromes. Women are more frequently affected then men. In mild to moderate cases, pain is present only with activity while in severe cases pain persists even on rest.[2] The mechanism of pain generation may include musculo-tendinous strains, tendinitis, interosseous membrane pain, periostitis or fascial inflammation.[1]

The biomechanical factors associated with shin splints may

© Red Flower Publication Pvt. Ltd.

include Foot over pronation, excessively tight gastro-soleus, tibialis anterior and tibialis posterior muscle.[3] The extrinsic factors responsible for shin splints involve duration, frequency and type of activity, improper footwear, increase loading over foot for long duration. With the alteration of these extrinsic factors, the risk of shin splints may be reduced, while the alteration of intrinsic factors may be difficult. The intrinsic risk factors may include increased Navicular drop, increased foot pronation during the loading response of the gait cycle, higher BMI, lean calf girth and increased plantar-flexion range of motion.[4] Previous studies reported that over foot pronation may lead to increase in eccentric load on deep plantar flexors and invertors that causes overstrain on the medial aspect of tibia.[4,5]

To the best of author's knowledge, there are no clinical studies till date, have examined the effect of Instrument Assisted Soft tissue Mobilisation (IASTM) on shin splints. The purpose of this case report is to evaluate the enhancing effect of IASTM along with conventional rehabilitation programme for the management of Acute Shin Splints.

CASE REPORT

A 63 year old male patient visited our physiotherapy centre due to pain in his left lower leg since one week. He stated no previous history of similar pain. The patient is a manufacturer of furniture goods. His daily job includes a long period of standing and kneeling which increases the rate of loading in his medial tibia, ankle and foot. The weight, height and BMI of patient was 70 kg, 170 cm and 24.2 kg/m^2 respectively. Due to extensive furniture making work for one week, pain provokes in his left lower leg. Initially symptoms were mild during walking but later his pain gets severe even with weight bearing.

A comprehensive subjective and objective examination was performed on the patient. There was no atrophy in his left lower leg when compared with right leg. Knee and Ankle range of motion were within normal limits. Left lower extremity muscle strength was measured by manual muscle testing. On Visual Analog Scale (VAS), Pain on rest was 3 while on weight bearing it was 8 out of 10. On palpation, tenderness was present on anterior, medial and posterior side of tibia. Soft tissue evaluation shows adhesion formation in the medial gastro-soleus, tibialis anterior muscles as well as there was tightness of these muscles. Dorsalis Pedis and Posterior tibial pulses were normal. The sensory evaluation and deep tendon reflexes were normal. Shin Palpation test was performed to confirm the shin splint diagnosis. Patient's low-third of lower leg and surrounding musculature was squeezed with enough pressure and if there is any pain present, then the test is positive. Several laboratory findings such as biochemical parameters, erythrocyte sedimentation rate, Creactive protein and Rheumatoid factor were also normal.

In weight bearing position, patient had bilateral pronated feet as well as loss of longitudinal arch leading to Pes Planus. The MRI of left tibia was done which indicated that bone shows presence of normal bone marrow signal with well defined cortical margins. No Periosteal reactions seen. Sorrounding soft tissues of both antererior and posterior compartment were also normal. There was mild edema seen in subcutaneous adipose tissue of medial aspect of tibia. (Fig. 1)

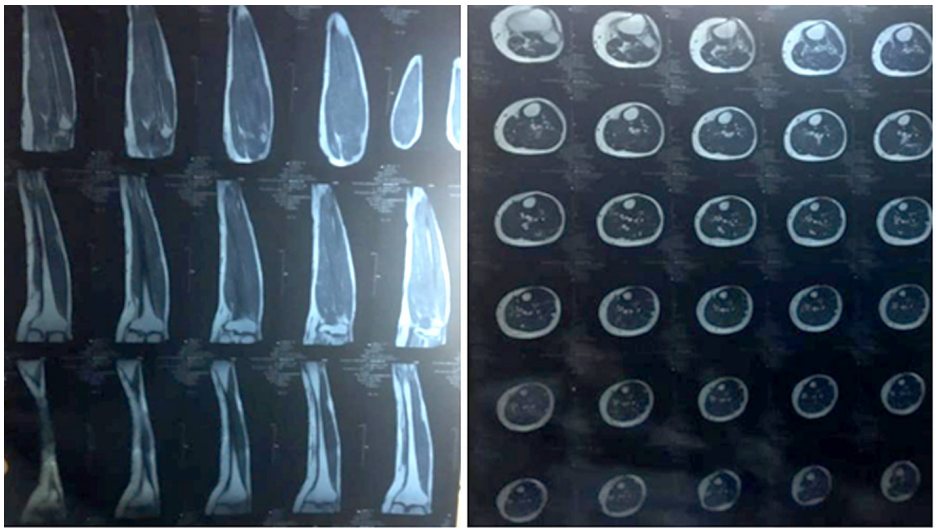


Fig. 1: Plane MRI Findings of Left lower Leg, Axial and Coronal images.

Active Plantarflexion and toe weight bearing on one foot aggravates severe pain which supports the diagnostic manoeuvre for Shin Splints. These clinical findings represent the diagnosis of Acute Shin Splints with associated Myofascitis.

The written informed consent was taken from the patient and procedure was explained. Before starting the intervention baseline assessment was performed, Left lower extremity muscle strength was measured by manual muscle testing. Muscle Strength of Gastronemius and soleus was assessed in supine lying with strength of grade 3+ and grade 4 respectively. Muscle strength of Tibialis anterior and Tibialis posterior was assessed in supine was grade 3 and grade 4 respectively. On Visual Analog Scale (VAS), Pain on rest was 3 while on weight bearing it was 8 out of 10. The Physiotherapy rehabilitation aims to reduce pain, tenderness and increase muscle strength as well as maintaining that strength and improving his job specific daily activity skills in his long term goals. Rehabilitation includes Ankle toe pumps and Advance technique of Instrument Assisted Soft tissue mobilization (IASTM) was applied to break the soft tissue adhesions. The Patient lies supine in a comfortable position. A lubricant in the form of Vaseline Petroleum jelly was applied on the antero-medial aspect of tibia.

The Polar-IASTM tool was used for the treatment (Figure 2).

Fig. 2: Polar-IASTM tool.

First, with the help of tool exact areas of adhesions were located. Then, at 450 angle slow strokes were applied along the muscle length, from muscle origin to insertion for approximately 3 minutes.[6] This procedure was performed thrice a week for one week on alternate days (Figure 3). During the intervention, no adverse effects were reported. After the completion of this session, conventional physiotherapy was provided that includes passive stretching of gastro-soleus and tibialis anterior muscle, stretching of these muscles was performed with hold position of 30 seconds with 3 repetitions After the intervention, Left lower extremity muscle strength was again measured by manual muscle testing.

Fig. 3: Application of IASTM Over Media Aspect of Tibia.

Muscle Strength of Gastronemius and soleus was grade 4 and grade 4+ respectively. Muscle strength of Tibialis anterior and Tibialis posterior was grade 4 and grade 4+ respectively. On Visual Analog Scale (VAS), Pain on rest was reduced 1 while on weight bearing it was 3 out of 10. Patient was advised to perform self stretches at home daily for next one week as a follow-up. After one week of follow-up, again the assessment was performed there was significant reduction of pain in his left lower leg. VAS gets reduced to 1 on weight bearing and 0 at rest. His lower extremity muscle strength also increased. Muscle Strength of Gastronemius and soleus was grade 4+ and grade 5 respectively. Muscle strength of Tibialis anterior and Tibialis posterior was grade 4+ and grade 4+ respectively. After the follow-up of one week, his symptoms completely disappear and he resumed his job and work activities.

RESULTS

The purpose of this case report is to evaluate the enhancing effect of IASTM along with conventional rehabilitation programme for the management of Acute Shin Splints. There was reduction in pain and lower extremity muscle strength was also improved in outcomes such as Visual Analog scale and Manual muscle testing which are discussed in Table 1 After the follow-up of one week, patient symptoms completely disappear and he resumed his job and work activities.

Table1: Improvement in Pain and lower extremity muscle strength in post intervention and after one week follow-up in the following outcomes.

Outcomes	Pre-intervention	Post-intervention	After one week Follow-up
Visual Analog Scale (on rest)	3	1	0
Visual Analog Scale (on weight bearing)	8	3	1
Gastronemius Muscle strength	3+	4	4+
Soleus Muscle strength	4	4+	5
Tibialis anterior Muscle strength	3	4	4+
Tibialis Posterior Muscle strength	4	4+	4+

DISCUSSION

The purpose of this study was to evaluate the effect of IASTM along with conventional rehabilitation program for the management of Acute Shin Splints. The patient got complete relief after the one week intervention period. After the follow up of one week, there was no re-occurrence of symptoms. The lower leg pain may results in different clinical conditions. In extreme cases, this condition can also lead to stress fracture of tibia and Acute Compartmental Condition (ACS). In ACS, a localized and sharp pain is felt in some acute cases, whereas in Shin Splints the pain is poorly localized. Thus, exact diagnosis should be made in an appropriate time.[7,8] IASTM break up the soft tissue adhesions and cause micro-trauma. This inflammatory process increases the fibroblast formation. The more recruitment of fibroblast causes increase in collagen synthesis and soft tissue remodeling which leads to faster healing. IASTM helps in improving tissue oxygenation and removal of local waste metabolites.[9] The limitation of this case study is that the effect of IASTM is seen in only one case, thus the effects of this technique cannot be generalized to whole shin splints population.

CONCLUSION

The study concluded that IASTM showed a promising result in managing the Acute Shin Splints. IASTM should be used as an addition to conventional rehabilitation program for the enhancing effects, to maintain the proper biomechanics of muscles and to prevent the reoccurrence of symptoms. Future experimental studies should examine the effects of IASTM in Shin Splints with a larger sample size to strengthen the evidence.

Conflicts of Interest: The authors have no conflict of interest to declare.

REFERENCES

1. Krenner BJ. Comprehensive management of medial tibial stress syndrome. J Chiropr Med. 2002; 1(3): 122-4.
2. Wilder RP, Sethi S. Overuse injuries: tendinopathies, stress fractures, compartment syndrome, and shin splints. Clin Sports Med. 2004; 23(1): 55-81.
3. Jovicic M, Jovicic V, Hrkovic M, Lazovic M. Medial tibial stress syndrome: case report. Med Pregl. 2014; 67(7-8): 247-51.
4. Griebert MC, Needle AR, McConnell J, Kaminski TW. Lower-leg Kinesio tape reduces rate of loading in participants with medial tibial stress syndrome. Phys Ther Sport. 2016; 18: 62-67.
5. Beck BR. Tibial stress injuries. An aetiological review for the purposes of guiding management. Sports Med. 1998; 26(4): 265-79.
6. Gulick D. Instrument-assisted soft tissue mobilization increases myofascial trigger point pain threshold. J Bodyw Mov Ther. 2018; 22: 341-345.
7. Kortebein PM, Kaufman KR, Basford JR, Stuart MJ. Medial tibial stress syndrome. Med Sci Sports Exerc. 2000; 32 Suppl 3: 278-33.
8. Moen MH, Tol JL, Weir A, Steunebrink M, De Winter TC. Medial tibial stress syndrome. Sports Med. 2009; 39(7): 523-46.
9. El-hafez HM, Hamdy HA, Takla MK, Ahmed SEB, Genedy AF, Abd EL-Azeim ASS. Instrument-assisted soft tissue mobilizations versus stripping massage for upper trapezius myofascial trigger points. J Taibah Univ Med Sc. 2020; 15(2): 1-7

Red Flower Publication Pvt. Ltd.

CAPTURE YOUR MARKET

For advertising in this journal

Please contact:

International print and online display advertising sales
Advertisement Manager
Phone: 91-11-79695648, Cell: +91-9821671871
E-mail: info@rfppl.co.in

Recruitment and Classified Advertising
Advertisement Manager
Phone: 91-11-79695648, Cell: +91-9821671871
E-mail: info@rfppl.co.in

SUBSCRIPTION FORM

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

Subscription Rates:
• Institutional: **INR 9500/USD 742**

Name and complete address (in capitals):_____

_____

Payment detail:
Online payment link: http://rfppl.co.in/payment.php?mid=15

Cheque/DD: Please send the US dollar check from outside India and INR check from India made payable to 'Red Flower Publication Private Limited'. Drawn on Delhi branch.

Wire transfer/NEFT/RTGS:
Complete Bank Account No. 604320110000467
Beneficiary Name: Red Flower Publication Pvt. Ltd.
Bank & Branch Name: Bank of India; Mayur Vihar
MICR Code: 110013045
Branch Code: 6043
IFSC Code: BKID0006043 (used for RTGS and NEFT transactions)
Swift Code: BKIDINBBDOS

Term and condition for supply of journals
1. Advance payment required by Demand Draft payable to **Red Flower Publication Pvt. Ltd**. payable at **Delhi.**
2. Cancellation not allowed except for duplicate payment.
3. Agents allowed 12.5% discount.
4. Claim must be made within six months from issue date.

Mail all orders to
Subscription and Marketing Manager
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091(India)
Phone: 91-11-79695648, Cell: +91-9821671871
E-mail: sales@rfppl.co.in

Guidelines for Authors

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journal" developed by international committee of medical Journal Editors

Types of Manuscripts and Limits

Original articles: Up to 3000 words excluding references and abstract and up to 10 references.

Review articles: Up to 2500 words excluding references and abstract and up to 10 references.

Case reports: Up to 1000 words excluding references and abstract and up to 10 references.

Online Submission of the Manuscripts

Articles can also be submitted online from http://rfppl.co.in/customer_index.php.

I) First Page File: Prepare the title page, covering letter, acknowledgement, etc. using a word processor program. All information which can reveal your identity should be here. use text/rtf/doc/PDF files. Do not zip the files.

2) Article file: The main text of the article, beginning from Abstract till References (including tables) should be in this file. Do not include any information (such as acknowledgement, your name in page headers, etc.) in this file. Use text/rtf/doc/PDF files. Do not zip the files. Limit the file size to 400 Kb. Do not incorporate images in the file. If file size is large, graphs can be submitted as images separately without incorporating them in the article file to reduce the size of the file.

3) Images: Submit good quality color images. Each image should be less than 100 Kb in size. Size of the image can be reduced by decreasing the actual height and width of the images (keep up to 400 pixels or 3 inches). All image formats (jpeg, tiff, gif, bmp, png, eps etc.) are acceptable; jpeg is most suitable.

Legends: Legends for the figures/images should be included at the end of the article file.

If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks from submission. Hard copies of the images (3 sets), for articles submitted online, should be sent to the journal office at the time of submission of a revised manuscript. Editorial office: Red Flower Publication Pvt. Ltd., 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi – 110 091, India, Phone: 91-11-79695648, Cell: +91-9821671871. E-mail: author@rfppl.co.in. Submission page: http://rfppl.co.in/article_submission_system.php?mid=5.

Preparation of the Manuscript

The text of observational and experimental articles should be divided into sections with the headings: Introduction, Methods, Results, Discussion, References, Tables, Figures, Figure legends, and Acknowledgment. Do not make subheadings in these sections.

Title Page

The title page should carry

1) Type of manuscript (e.g. Original article, Review article, Case Report)

2) The title of the article should be concise and informative;

3) Running title or short title not more than 50 characters;

4) The name by which each contributor is known (Last name, First name and initials of middle name), with his or her highest academic degree(s) and institutional affiliation;

5) The name of the department(s) and institution(s) to which the work should be attributed;

6) The name, address, phone numbers, facsimile numbers and e-mail address of the contributor responsible for correspondence about the manuscript; should be mentoined.

7) The total number of pages, total number of photographs and word counts separately for abstract and for the text (excluding the references and abstract);

8) Source(s) of support in the form of grants, equipment, drugs, or all of these;

9) Acknowledgement, if any; and

l0) If the manuscript was presented as part at a meeting, the organization, place, and exact date on which it was read.

Abstract Page

The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

© Red Flower Publication Pvt. Ltd.

Introduction

State the background of the study and purpose of the study and summarize the rationale for the study or observation.

Methods

The methods section should include only information that was available at the time the plan or protocol for the study was written such as study approach, design, type of sample, sample size, sampling technique, setting of the study, description of data collection tools and methods; all information obtained during the conduct of the study belongs in the Results section.

Reports of randomized clinical trials should be based on the CONSORT Statement (http:// www. consort-statement. org). When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 (available at http://www.wma. net/e/policy/l7-c_e.html).

Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical details can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

Discussion

Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

References

List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540–7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347–55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone-iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3–9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792–801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. pp 7–27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979–2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

More information about other reference types is available at www.nlm.nih.gov/bsd/uniform_ requirements.html, but observes some minor deviations (no full stop after journal title, no issue or date after volume, etc.).

Tables

Tables should be self-explanatory and should not duplicate textual material.

Tables with more than 10 columns and 25 rows are not acceptable.

Table numbers should be in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.

Explain in footnotes all non-standard abbreviations that are used in each table.

For footnotes use the following symbols, in this sequence: *, ¶, †, ‡‡,

Illustrations (Figures)

Graphics files are welcome if supplied as Tiff, EPS, or PowerPoint files of minimum 1200x1600 pixel size. The minimum line weight for line art is 0.5 point for optimal printing.

When possible, please place symbol legends below the figure instead of the side.

Original color figures can be printed in color at the editor's and publisher's discretion provided the author agrees to pay.

Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations.

Sending a revised manuscript

While submitting a revised manuscript, contributors are requested to include, along with single copy of the final revised manuscript, a photocopy of the revised manuscript with the changes underlined in red and copy of the comments with the point-to-point clarification to each comment. The manuscript number should be written on each of these documents. If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks of submission. Hard copies of images should be sent to the office of the journal. There is no need to send printed manuscript for articles submitted online.

Reprints

Journal provides no free printed, reprints, however a author copy is sent to the main author and additional copies are available on payment (ask to the journal office).

Copyrights

The whole of the literary matter in the journal is copyright and cannot be reproduced without the written permission.

Declaration

A declaration should be submitted stating that the manuscript represents valid work and that neither this manuscript nor one with substantially similar content under the present authorship has been published or is being considered for publication elsewhere and the authorship of this article will not be contested by any one whose name(s) is/are not listed here, and that the order of authorship as placed in the manuscript is final and accepted by the co-authors. Declarations should be signed by all the authors in the order in which they are mentioned in the original manuscript. Matters appearing in the Journal are covered by copyright but no objection will be made to their reproduction provided permission is obtained from the Editor prior to publication and due acknowledgment of the source is made.

Approval of Ethics Committee

We need the Ethics committee approval letter from an Institutional ethical committee (IEC) or an institutional review board (IRB) to publish your Research article or author should submit a statement that the study does not require ethics approval along with evidence. The evidence could either be consent from patients is available and there are no ethics issues in the paper or a letter from an IRB stating that the study in question does not require ethics approval.

Abbreviations

Standard abbreviations should be used and be spelt out when first used in the text. Abbreviations should not be used in the title or abstract.

Checklist

- Manuscript Title
- Covering letter: Signed by all contributors
- Previous publication/ presentations mentioned, Source of funding mentioned
- Conflicts of interest disclosed

Authors

- Middle name initials provided.
- Author for correspondence, with e-mail address provided.
- Number of contributors restricted as per the instructions.
- Identity not revealed in paper except title page (e.g. name of the institute in Methods, citing previous study as 'our study')

Presentation and Format

- Double spacing
- Margins 2.5 cm from all four sides
- Title page contains all the desired information. Running title provided (not more than 50 characters)
- Abstract page contains the full title of the manuscript
- Abstract provided: Structured abstract provided for an original article.
- Keywords provided (three or more)
- Introduction of 75-100 words
- Headings in title case (not ALL CAPITALS). References cited in square brackets
- References according to the journal's instructions

Language and grammar

- Uniformly American English
- Abbreviations spelt out in full for the first time. Numerals from 1 to l0 spelt out
- Numerals at the beginning of the sentence spelt out

Tables and figures

- No repetition of data in tables and graphs and in text.
- Actual numbers from which graphs drawn, provided.
- Figures necessary and of good quality (color)
- Table and figure numbers in Arabic letters (not Roman).
- Labels pasted on back of the photographs (no names written)
- Figure legends provided (not more than 40 words)
- Patients' privacy maintained, (if not permission taken)
- Credit note for borrowed figures/tables provided
- Manuscript provided on a CDROM (with double spacing)

Submitting the Manuscript

- Is the journal editor's contact information current?
- Is the cover letter included with the manuscript? Does the letter:

1. Include the author's postal address, e-mail address, telephone number, and fax number for future correspondence?
2. State that the manuscript is original, not previously published, and not under concurrent consideration elsewhere?
3. Inform the journal editor of the existence of any similar published manuscripts written by the author?
4. Mention any supplemental material you are submitting for the online version of your article. Contributors' Form (to be modified as applicable and one signed copy attached with the manuscript)