Colegiul de redacție

Redactor șef: Ciobanu Doriana (Oradea, Romania) Redactor șef adjunct: Lozincă Izabela (Oradea, Romania)

Colectivul editorial - membri naționali

Conf. univ. dr. Ianc Dorina - Universitatea din Oradea, FEFS

Lect. univ. dr. Chiriac Mircea - Universitatea din Oradea, FEFS

Lect. univ. dr. Ciobanu Doriana – Universitatea din Oradea, FEFS

Lect. univ. dr. Emilian Tarcău - Universitatea din Oradea, FEFS

Asist.univ. drd. Deac Anca - Universitatea din Oradea, FEFS

Colectivul editorial - membri internaționali

conf. univ.dr. Sayed Tantawy - Universitatea Ahlia, Cairo, Egipt

conf. univ.dr. Dalia Kamel -Universitatea de Fizioterapie, Cairo- Egipt

Comisia de peer review

» Membri Internaționali

Hermann van Coppenolle – prof. univ.dr.., Faculty of Physical Education and Physiotherapy, K.U. Leuven, Belgium

Croitoru Gheorghe MD - prof. univ. dr., USMF "Nicolae Testemiţanu" catedra de ortopedie, traumatologie şi chirurgie de campanie, Chişinău, Rep. Moldova

Cseri Juliana MD – prof.univ. dr., University of Debrecen, Medical and Health Science Center, Faculty of Public Health, Department of Physiotherapy, Hungary

Jeff G. Konin-prof.univ.dr. ATC, PT, & Vice Chair, Department of Orthopaedics & Sports Medicine University of South Florida; Executive Director Sports Medicine & Athletic Related Trauma (SMART) Institute

Daniel Courteix – prof.univ.dr. Universitatea Blaise Pascal - Clermont Ferrand, UFR - Sciences et Techniques des Activités Physiques et Sportives (STAPS); École Doctorale Sciences de la Vie, Santé, Agronomie, Environnement, Franța

Ali Cimbiz –prof. univ.dr. – Universitatea Zirve Uni, Facult of Health Science, Gaziantep-Turkey

Ugur Cavlak - prof. univ.dr.. - Pamukkale University, Denizli, Turkey. Director of School of Physical Therapy. School of Physical Therapy and Rehabilitation

Filiz Altug- conf.univ. dr. – Universitatea Pamukkale, School of Physical Therapy and Rehabilitation. KınıklıKampusu

Nilüfer Çetisli Korkmaz – conf.univ.dr. Universitatea Mustafa Kemal, Şcoala de

» Membri Naționali

Vasile Marcu – prof. univ. dr., Universitatea din Oradea

Bălteanu Veronica – prof.univ. dr. Universitatea din Iași

Mirela Dan – prof. univ.dr. Universitatea Vasile Goldis, Arad

Georgescu Luminița – prof.univ.dr. Universitatea din Pitesti

Ciucurel Constantin – prof.univ.dr. Universitatea din Pitesti

Pasztai Zoltan - conf. univ. dr. Universitatea din Oradea

Lozincă Isabela - conf. univ. dr. Universitatea din Oradea

Şerbescu Carmen - conf. univ. dr. Universitatea din Oradea

Revista poate fi accesată on-line, pe adresa de web: www.revrokineto.com

Persoane de contact: Ciobanu Doriana: Mobil: 0722 187589/ E-mail: doriana.ciobanu@yahoo.com
Lozincă Izabela: Mobil: 0747 057/304/ E-mail: ilozinca@yahoo.com

UNIVERSITATEA DIN ORADEA

Str. Universității nr.1, 410087, ORADEA

Facultatea de Geografie, Turism și Sport Departamentul de Educație Fizică, Sport și Kinetoterapie Telefoane: 04-0259-408148; 04-0259-408164; 0722-384835

Fax: 04-0259-425921

Editorial Board

Editor in chief: Ciobanu Doriana (Oradea, Romania) Copy-reader: Lozincă Izabela (Oradea, Romania)

National members

Assoc. Prof. Ph.D. Ianc Dorina - University of Oradea, FEFS Lecturer Ph.D. Pâncotan Vasile - University of Oradea, FEFS Lecturer Ph.D. Chiriac Mircea – University of Oradea, FEFS Lecturer Ph.D. Tarcău Emilian - University of Oradea, FEFS Junior lecturer Deac Anca - University of Oradea, FEFS

International members

Associate Prof. Sayed Tantawy - Ahlia University, Cairo, Egypt Associate Prof. Dalia Kamel - Physical Therapy-Cairo University- Egypt

Review Board

» Internațional Members

Hermann van Coppenolle – Professor, Ph.D, Faculty of Physical Education and Physiotherapy, K.U. Leuven, Belgium

Croitoru Gheorghe MD - Prof. Ph.D, USMF "Nicolae Testemiţanu", Department of Ortopedic, traumatology and suregery, Chişinău, Rep. Moldova

Cseri Juliana MD – Professor, Ph.D, University of Debrecen, Medical and Health Science Center, Faculty of Public Health, Department of Physiotherapy, Hungary

Jeff G. Konin – Ph.D, ATC, PT, Associate Professor & Vice Chair, Department of Orthopaedics & Sports Medicine University of South Florida; Executive Director Sports Medicine & Athletic Related Trauma (SMART) Institute

Daniel Courteix – prof. Ph.D. University Blaise Pascal - Clermont Ferrand, UFR - Sciences et Techniques des Activités Physiques et Sportives (STAPS); École Doctorale Sciences de la Vie, Santé, Agronomie, Environnement, France

Ali Cimbiz - professor, Ph.D. - Zirve University, Faculty of Health Science, Gaziantep-Turkey

Ugur Cavlak - prof. Ph.D. - Pamukkale University, Denizli, Turkey. Director of School of Physical Therapy. School of Physical Therapy and Rehabilitation

Filiz Altug- assoc. prof., Ph.D - Pamukkale University, School of Physical Therapy and Rehabilitation. Kınıklı Kampusu

Nilüfer Çetisli Korkmaz – assoc. prof. Ph.D Mustafa Kemal University, School of Physical Therapy and Rehabilitation

» Național Members

Vasile Marcu – Professor. Ph.D, University of Oradea

Bălteanu Veronica – Professor. Ph.D, University from Iași

Mirela Dan -Professor. Ph.D, University Vasile Goldis, Arad

Georgescu Luminița – Professor PhD. University of Pitești

Ciucurel Constantin – Professor Ph.D, University of Pitesti

Pasztai Zoltan - Assistant Prof. Ph.D, University of Oradea

Lozincă Isabela - Assistant Prof. Ph.D, University of Oradea

Şerbescu Carmen - Assistant Prof. Ph.D, University of Oradea

Journal website: www.revrokineto.com

Contact persons: Ciobanu Doriana: Mobil: 0722 187589/ e-mail: doriana.ciobanu@yahoo.com, Lozincă Izabela: Mobil: 0747 057/304/ e-mail: ilozinca@yahoo.com

UNIVERSITATEA DIN ORADEA Str. Universității nr.1, 410087, ORADEA Facultatea de Geografie, Turism și Sport

Departamentul de Educație Fizică, Sport și Kinetoterapie

Telefoane: 04-0259-408148; 04-0259-408164; 0722-384835/ Fax: 04-0259-425921

CUPRINS / CONTENT

| THE EFFECTIVENESS OF BOWEN TECHNIQUE AS AN ADJUNCT TO |
|---|
| CONVENTIONAL PHYSIOTHERAPY ON PAIN AND FUNCTIONAL |
| OUTCOMES IN SUBJECT WITH ACUTE TRAPEZITIS – A PILOT STUDY5 |
| THE EFFECTIVENESS OF BOWEN TECHNIQUE AS AN ADJUNCT TO CONVENTIONAL PHYSIOTHERAPY ON PAIN AND FUNCTIONAL |
| OUTCOMES IN SUBJECT WITH ACUTE TRAPEZITIS – A PILOT STUDY5 |
| Peeyoosha Nitsure, Neha Kothari |
| A COMPARATIVE STUDY ON THE EFFECTIVENESS OF CORE |
| STABILITY EXERCISE AND PELVIC PROPRIOCEPTIVE |
| NEUROMUSCULAR FACILITATION ON BALANCE, MOTOR RECOVERY |
| AND FUNCTION IN HEMIPARETIC PATIENTS: A RANDOMIZED |
| CLINICAL TRIAL 12 |
| A COMPARATIVE STUDY ON THE EFFECTIVENESS OF CORE STABILITY EXERCISE AND PELVIC PROPRIOCEPTIVE |
| NEUROMUSCULAR FACILITATION ON BALANCE, MOTOR RECOVERY |
| AND FUNCTION IN HEMIPARETIC PATIENTS: A RANDOMIZED |
| AND FUNCTION IN HEMIPARETIC PATIENTS: A RANDOMIZED CLINICAL TRIAL 12 |
| Jeba Chitra, Rishabh Sharan |
| A SYSTEMATIC REVIEW ON BEHAVIORAL AND PHYSICAL |
| TREATMENT APPROACHES FOR MANAGEMENT OF MIGRAINE 19 |
| A SYSTEMATIC REVIEW ON BEHAVIORAL AND PHYSICAL |
| TREATMENT APPROACHES FOR MANAGEMENT OF MIGRAINE |
| Manoj Malik, Shailendra Kumar Singh, Narkeesh Arumugam |
| ECHILIBRUL, STATUSUL OSOS ȘI STATUSUL MUSCULAR ÎN SCLEROZA |
| MULTIPLĂ 30 |
| BALANCE, BONE AND MUSCLE STATUS IN MULTIPLE SCLEROSIS 30 |
| Ianc Dorina, Ilcu Flavia, Tarcău Emilian, |
| Ciobanu Doriana, Boca Ioan Cosmin, Chiriac Mircea |
| EFFECT OF ABDOMINAL DRAWING-IN MANEUVER ALONG WITH |
| RESISTED ANKLE DORSI-FLEXION TO ACTIVATE TRANSVERSE ABDOMINIS MUSCLE IN CHRONIC NON-SPECIFIC LOW BACK PAIN 40 |
| EFFECT OF ABDOMINAL DRAWING-IN MANEUVER ALONG WITH |
| RESISTED ANKLE DORSI-FLEXION TO ACTIVATE TRANSVERSE |
| ABDOMINIS MUSCLE IN CHRONIC NON-SPECIFIC LOW BACK PAIN 40 |
| Sharma Khushbu Dineshkumar, Bid Dibyendunarayan ² , |
| Thangamani Ramalingam A. ³ |
| PREVALENCE OF BRUXISM IN CHILDREN WITH SPASTIC CEREBRAL |
| PALSY- A CROSS SECTIONAL STUDY 48 |

| PREVALENCE OF BRUXISM IN CHILDREN WITH SPASTIC | CEREBRAL |
|--|----------|
| PALSY- A CROSS SECTIONAL STUDY | 48 |
| Deepa Metgud , Pallavi Sharma | 48 |
| RECOMANDĂRI PENTRU AUTORI | 53 |
| | 53 |
| RECOMMENDATIONS FOR THE AUTHORS | |
| TALON DE ABONAMENT | 60 |

THE EFFECTIVENESS OF BOWEN TECHNIQUE AS AN ADJUNCT TO CONVENTIONAL PHYSIOTHERAPY ON PAIN AND FUNCTIONAL OUTCOMES IN SUBJECT WITH ACUTE TRAPEZITIS – A PILOT STUDY

EFICIENȚA TERAPIEI BOWEN CA ADJUVANT ÎN FIZIOTERAPIA CONVENȚIONALĂ A DURERII ȘI FUNCȚIEI, LA SUBIECȚII CU TRAPEZITĂ ACUTĂ – STUDIU PILOT

Peeyoosha Nitsure¹, Neha Kothari²

Keywords: trapezitis, conventional physiotherapy, Bowen technique

Abstract.

Background: Trapezitis is an inflammation of trapezius muscle that is commonly seen in clinical practice. Various physiotherapy techniques have shown to be effective in Trapezitis. Although the Bowen technique is indicated in Trapezitis, there is dearth in literature to confirm its effectiveness through scientific studies.

Objective: To evaluate the effect of Bowen Technique as an adjunct to the conventional physiotherapy treatment on Trapezitis in terms of pain, disability and cervical range of motion.

Design: Pilot study

Participants: 15 participants both male and female with Acute Trapezitis.

Intervention: Bowen technique given along with Ultrasound, Trapezius stretching and neck strengthening exercises.

Outcome measures: Visual Analogue scale, Neck Disability Index, Cervical rotation Active Range of Motion

Results: The mean difference between pre and post treatment values for VAS, NDI and cervical rotation ROM was 5.25±1.40, 24.60±5.19 and 22±8.25. All outcome measures were statistically significant (p<0.05) and showed improvement for all the participants

Conclusion: Bowen technique is effective in reducing pain, improving ROM and reducing neck disability in patients with Acute Trapezitis.

Cuvinte cheie: trapezită, terapie convențională, terapia Bowen

Rezumat

Introducere: Trapezita este o inflamație a mușchiului trapez, foarte frecventă în clinică. Numeroase tehnici fizioterapeutice s-au dovedit a fi eficiente în acest caz. Cu toate că tehnica Bowen este indicată în trapezită, nu există studii care să îi ateste eficienta.

Obiective: Evaluarea eficienței tehnicii Bowen ca adjuvant al fizioterapiei în trapezită, în ceea ce privește dureera, disabilitatea și mobilitatea cervicală.

Design: studiu pilot

Participanți: 15 participanți, barbați și femei cu trapezită acută.

Intervenție: Tehnica Bowen alături de ultrasunet, stretchingul trapezului și exerciții de tonifiere a gâtului.

Mijloace ede evaluare: Scala Analog Vizuală, Neck Disability Index, mobilitatea activă de rotație cervicală.

Rezultate: Diferența medie dintre valorile pretest și posttest pentre VAS, NDI și rotația cervicală activă a fost 5.25±1.40, 24.60±5.19 și 22±8.25. Toate rezultatele au fost semnificative statistic (p<0.05), demonstrând îmbunătățirea parametrilor evaluați la toți pacienții.

Concluzii: Tehnica Bowen este eficientă în reducerea durerii, creșterea amplitudinii de rotație cervicală și reducerea disabilității, la subiecții cu trapezită.

Introduction

Correspondent author: E-mail id: peeoo123@yahoo.com

¹ MPT, Assistant Professor, Dept of Orthopaedic P.T, KLEU Institute of Physiotherapy, Belagavi-590010, Karnataka, India.

² Post Graduate Student, Dept of Orthopaedic P.T, KLEU Institute of Physiotherapy, Belagavi -590010, Karnataka, India. E-mail: nehakothari.ytl@gmail.com

The skeletal muscle is the single largest organ in human body. It accounts for nearly 50% of the body weight. Any of these muscles may develop pain and dysfunction.[1] There are many epidemiologic studies suggesting that myofascial pain syndrome is an important source of musculoskeletal dysfunction.[2] The prevalence of this syndrome has increased dramatically in recent years and is foremost among the causes of musculoskeletal pain.[2,3] The prevalence varies from 21% of patients seen in a general orthopedic clinic to 30% of general medical clinic patients. The regional pain prevalence is 85% to 90% of patients presenting to pain management centre. Women and men are affected equally.[4] In modern society myofascial pain is a major cause of morbidity. It may be present as a regional musculoskeletal pain, as neck or back mimicking radiculopathy.[1]

The trapezius muscle is an inverted triangle starts at the base of the skull, spreads over the shoulders and down to the mid back.[5] The trapezius muscle is divided into three areas upper fibres, middle fibres, lower fibres.[5] It has several functions such as to move the shoulder blade in toward the spine, to rotate the shoulder blade so that the top most part of the upper arm faces up, to move the shoulder blade up and down, to bring the head and neck in a backward direction, to rotate and side bend the neck, to assist in breathing. Since the trapezius muscle works to move the neck in several directions ,its degree of tightness or looseness affects neck flexibility.[6]

Trapezitis is defined as inflammation of Trapezius muscle which involves myofascial pain syndrome. [7,8] The upper trapezius muscle is designated as postural muscle and it is highly susceptible to overuse. The pain is present even during rest and is aggravated by activity; it may be referred to another area from the site of primary inflammation [7].

Myofascial trigger point is a hyperirritable spot found within the taut band of skeletal muscle. In the modern computerised world we are facing more frequent musculoskeletal problems like trapezitis, joint pain, and other neck related conditions[9].

Passive range of motion may be painful and restricted due to pain and protective spasm in antagonist groups of muscles.[7] The excessive physical strain may cause microtrauma in connective tissues. The principle muscle to carry a load is the trapezius. Any position which places trapezius in a shortened state for a period without rest may shorten the fibres and lead to dysfunction and restricted movements of neck. [10] Recent studies have hypothesized that pathogenesis of trapezitis results from the overloading and injury of muscle tissue, leading to involuntary shortening of localized fibres. The areas of stressed soft tissue receive less oxygen, glucose and nutrients and subsequently accumulates high levels of metabolic waste products. The end result of this cascade of events is the creation of altered tissue status, pain and the development of Trigger points.[7]

Various physiotherapy techniques shown to be effective in trapezitis like rest, heat, Ultra-Sound[10], MWD[10], TENS[10], spray and stretch[10], and post- isometric relaxation manual therapy like MFR[11],MET[12], positional release are also effective in treatment of trapezius spasm. Treatment of trapezitis requires a multifaceted approach. In the short term, the aim is to abolish the taut bands, trigger points and tender points for pain relief. In the long term, flexibility has to be restored to the muscle so as to reduce the recurrence rate.[1]

Therapeutic ultrasound treatment is one of the most important physical therapy treatment modality in myofascial trigger points treatment is used for heating deep tissues. It is a non-invasive method which consists of piezoelectric crystals that convert the electrical energy to mechanical oscillation energy using high-frequency alternating current. US increases local metabolism, circulation, regeneration and extensibility of connective tissue with its assuming thermal and mechanical effects.[13]

Bowen Technique

There is one more proposed soft tissue technique named as Bowen Technique that is indicated in the myofascial pain but there is a paucity of literature proving its effectiveness.

The Bowen Technique is a dynamic system of muscle and connective tissue therapy that was developed by the late Tom Bowen in Geelong, Australia in the year of 1950. It utilizes subtle inputs to the body (known as moves), stimulating the body to heal itself, often profoundly.[8] A typical Bowen technique session lasts from 15-45 min it consists of several sets of moves. The Bowen moves are gentle but purposeful.[8] When executing a Bowen Move away from the patient's body we generally use the thumb, while executing a move toward the patient's body, we generally use two fingers. The technique can be used on the origin or the insertion of a muscle, the belly of the muscle itself. There is both a physical action and an energetic action.[9]

It can provide relief for many types of injuries and other health problems, both acute and chronic, and it does so holistically, via the body's innate healing mechanisms. It has been recommended in many conditions like whiplash, cervical and back pain, herniated disc, headache, tennis elbow, hamstring tightness, frozen shoulder and TMJ dysfunction.[8]Therefore, the purpose of the study is to study the effect of Bowen Technique on trapezitis.

Material and methods

This study was a pilot study and received ethical approval from the Institutional Ethical Review Board KLE University Belgaum, Karnataka, India. The 15 participants were recruited from Tertiary Care Hospital at Belagavi city. All participants gave informed consent to participants in the study.

Inclusion Criteria were: Both male and female subjects clinically diagnosed with Acute Trapezitis within age group of 20-45 years and those willing to participate. The exclusion Criteria for the study were Traumatic Neck Injury, Fracture of cervical vertebra, Cervical Spinal Cord Compromise, Cervical Radiculopathy, Spondylolisthesis of the cervical spine.

Outcome measures were:

- Visual Analogue Scale (VAS)
- Cervical Rotation Range of Motion (CROM)
- Neck Disability Index (NDI)

Visual analogue scale: Pain intensity was evaluated by means of VAS, a line of 10 cm ranging from 0 cm to 10 cm was drawn, where the subjects has to mark a point according to their pain level, where 0 represents No Pain and 10 represents Unbearable Pain.[14]

Cervical range of motion: The universal goniometer was used to measure the cervical rotation range of motion of opposite side. [15] The Values were noted in Degrees

Neck disability index: The participant's functional status is assessed by means of the Vernon Neck Disability Index (NDI). It is a 10-item questionnaire. The score of each item lies between 0 (no pain or limitation in activities) and 5 (as much pain as possible or maximal limitation). Total scores range between 0 and 50 points. [16]

Procedure

Before the intervention the pain intensity was documented on visual analogue scale (VAS) then Cervical Range of Motion (CROM) was measured. Neck Disability Index questionnaire (NDI) were provided to the subject. The questions on the scale were explained in detail and the subjects were then asked to choose the most appropriate alternative.

The participants received the following interventions.

- 1. Therapeutic ultrasound: U/S head size-1cm, mode-continuous, Intensity-variable according to pain threshold but within 1.5 watts/cm2, Range- 0.1 to 1.5 watts/ cm2, Treatment time- 5 mins and patient position-sitting[13] and
- 2. Trapezius stretching advised as home exercise (5 sec hold for 5 repetitions)
- 3. The conventional treatment was given for five sessions every day.

Bowen technique was given in the following steps:

1) The patient position was prone lying with small pillow for neck support.

- 2) Place the thumb on the affected side muscle.
- 3) Hook the thumb on the lateral edge of the muscle to form pressure against the muscle.
- 4) Create a slight pause as the nervous system registers a tension.
- 5) As the thumb begins to flatten in a medial direction, the muscle will pluck or plop or respond in some manner.
- 6) Carry the skin and challenge the muscle first with the thumbs followed by the fingers.
- 7) The hands are place with an inch of space between the thumbs and fingers so that the hands can play the muscles simultaneously.[8]

Treatment time - 20mins alternate day (3sessions)

Statistical Analysis

The results of statistical analysis were expressed as mean \pm SD (Standard deviations). The paired t test was used to calculate the pre and post differences between the outcome variables. The significance level of p value less than 0.05 was used for all comparisons. All analysis was performed using GraphPad InStat 3 software.

Results

The age of the participants choose for study was between 20 years and 45 years. The average age of participants was 27.8±6.3 years. There were total of 15 participants in study. (7 males, 8 females) The mean Body Mass Index score was 26.03±3.67kg/mt².

The mean VAS score for pre intervention was 8.40 ± 1.04 and the post intervention score was 3.15 ± 0.87 . The t value was 16.65 with p value of <0.0001 which was statistically significant. (Graph 1) Decrease in scores indicate better outcome.

The mean pre intervention score for cervical rotation range of motion (CROM) was 15.10±6.71 whereas post intervention score was 39.70±4.01. The t value was 18.62 and p value was < 0.0001 which showed to be statistically significant. (Graph 2) The increase in Scores indicate better outcome.

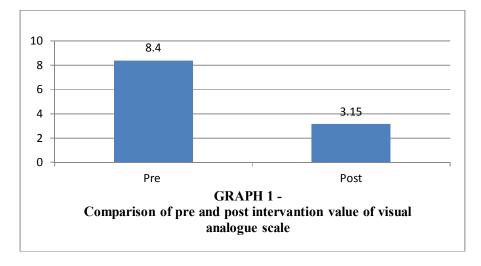
The mean neck disability index (NDI) values for pre intervention were 28.80 ± 7.55 while post intervention mean value was 6.80 ± 2.70 . When comparison of pre and post intervention values was done the t score was 11.91 and p value was <0.0001 which can be inferred as statistically significant. (Graph 3) The decrease in scores indicate better outcome.

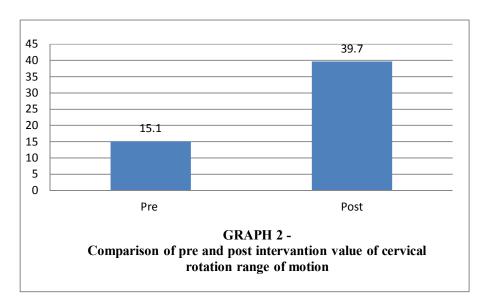
Hence, it can be inferred by the Table 1 that Bowen technique along with the conventional physiotherapy was effective for improving all the outcome measures.

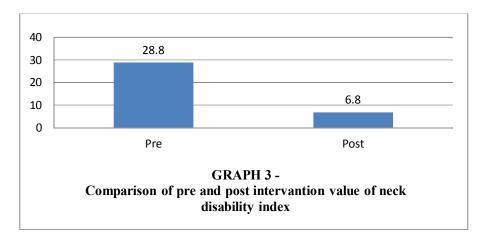
| Outcome Measures | ne Measures Pre- Post- treatment treatme | | Mean Difference | 4 | р |
|--|---|------------------|--------------------|-------|---------|
| | Mean ± SD | Mean± SD | Mean ±SD | Value | Value |
| Visual Analogue Scale | 8.40 ± 1.04 | 3.15 ± 0.87 | 5.25 ± 1.40 | 16.65 | 0.0001 |
| C-ROM* (rotation to non- affected side) | 15.10 ± 6.71 | 39.70 ± 4.01 | 24.60 ± 5.90 | 18.62 | 0.0001 |
| Neck Disability Index | 28.80 ±7.55 | 6.80 ±2.70 | 24.85 ± 1.84 | 11.91 | 0.0001* |

TABLE 1: Comparison of VAS, CROM and NDI

^{*}C-ROM – Cervical Range of Motion ; +: Statistically Significant







Discussion

The present study is the first pilot study to find the effectiveness of Bowen technique on pain and functional outcome in subject with Trapezitis.

The outcome measures of this study were VAS, CROM and NDI all showed improvements in all measure after treatment when compare to before treatment values. None of the participants reported aggregates in symptoms.

Bowen therapy was originally developed by an Australian, Mr Tom Bowen 1970. It is a gentle and relaxing cross fibre movements approach to release tension in fascia and musculoskeletal system to promote the flow of blood and lymph and there by assist the body to restore structural integrity and optimal function.

Bowen technique shows significant reduction in pain, improvement in CROM and neck disability. This effect can be attributed to the fact that Bowen therapy works through muscle reflexes to alert the central nervous system to release tension in areas that are holding more tension and tone in order to restore a proper resting muscle tone. There are responses triggered by such simple process and then end results is a lessening of pain and tension cycles and return to more optimal function. Fascia has a ubiquitous distribution that permeates the human body, forming a continuous matrix of structural support, serving different functions. [17]

A randomized control study done by Michelle Marr et al in 2010 on the effects of Bowen on hamstring flexibility revealed significant within-subject and between-subject differences for the Bowen group. There was significant improvement in flexibility levels observe over one week. No significant change over time was noted for the control group. [18]

A study was done by B.Carter et al to evaluate the effectiveness of Bowen Technique in the management of frozen shoulder in terms of their pain, functional ability and well-being and concluded that there was improvement in shoulder mobility and associated function for all participants and Bowen Technique demonstrated an improvement for participants, even those with a very longstanding history of frozen shoulder. [19]

The present study showed significant improvement in VAS, CROM and NDI as compared with previous study it is also showing positive results.

The thermal effect of ultrasound upon tissue; include increased blood flow, reduction in muscle spasm, increased extensibility of collagen fibres and pro inflammatory response may also help improve condition all participants received conventional therapy; thus, it may be difficult to separate additive effect of Bowen technique on Trapezitis. Hence future trial are recommended.

Limitations

The limitations of the present study were it was single centric and single group clinical trial. The sample size was small. The future scope of the study is that it can be done with larger sample size with long term follow up.

Conclusion

Based on the results of present study, it can be concluded that Bowen technique can be used as an effective adjunct to the conventional physiotherapy treatment in subjects with Acute Trapezitis. However, it is suggested that in future more Randomized clinical or controlled trials need to be done to confirm effectiveness of Bowen Technique as an independent therapy.

References

- [1] Eng-Ching Yap. (2007), Myofascial Pain An Overview, J. Annals Academy Of Medicine A; 1:36.
- [2] Cesar Fernandez Las Penas, Monica Sohrbeck Campo, Josue Fernandez Carnero, Juan Carlos Et.Al. (2005), Manual Therapies In Myofascial Trigger Point Treatment: A Systemic Review, *Journal Of Bodywork And Movement Therapies*; 9: 27-34.
- [3] Umit Dundar, Ozlem Solak, Vural Kavunc (2010), Effectiveness Of Ultrasound Therapy In Cervical Myofascial Pain Syndrome: A Double Blind, Placebo- Controlled Study, *Turk J Rheumatol*; 25:110-15.
- [4] Joanne Borg-Stein. (2006), Treatment of Fibromyalgia, Myofascial Pain & Relate Disorders, *Phys Med Rehabil Clin N Am*; 17: 491-510.

- [5] Richard L. Drak, A. Wayne Adam et. Al Gray's Anatomy 2nd Addition; Page No 89
- [6] Johnson G, Bogduk N, Nowitzke A, House D. (1994), Anatomy And Actions Of The Trapezius Muscle, *Clinical Biomechanics*; 9(1):44-50.
- [7] Carvalho S, Babu V, Kumar S, Ayyapan.V. R. (2014), Effect Of Positional Release Technique In Subjects With Sub-Acute Trapezitis, *Int J Physiother*; 1(2):91-99.
- [8] Rajalaxmi.A, Kumar. S, Shaker. I. (2013), Effect Of Transcutaneous Electrical Nerve Stimulation and Trapezitis, *International Journal Of Pyhsiotherapy And Research*; 1 (5):205-7.
- [9] Travell J.G, Simons D.G. (1983), Background And Principles In Myofascial Pain And Dysfunction— The Trigger Point Manual - The Upper Extremities, Baltimore ,Williams And Wilkins;1: 183-192.
- [10] Kumaresan A, Deepthi G, Anandh V, Prathap S. (2012), Effectiveness Of Positional Release Therapy In Treatment Of Trapezitis, *International Journal Of Pharmacutical Science And Health Care*; 2,(1).
- [11] Ekta Chaudhary, Nehal Shah, Neeta Vyas Et.Al (2013), Comparative Study Of MFR And Cold Pack In Upper Trapezius Spasm, *IJHMR*; 3 (12): 20-27.
- [12] Rich M, Chitra K., Kshitija B et. al (2012) Comparative Effectiveness Of MET And Static Stretching For Treatment Of Subacute Mechanical Neck Pain, *Int J Health Rehabil Sci*;1(1): 16-24.
- [13] Kannan P.(2012) Management Of Myofacial Pain Of Upper Trapezius: A Three Group Comparison Study, *Global Journal Of Health Science*; 4(5).
- [14] Paul S. Myles, Sally Troedel, Michael Boquest, Mark Reeves. (1999), The Pain Visual Analog Scale: Is It Linear Or Nonlinear?, *International Anaesthesia Research Society*; 89:1517-20.
- [15] Araya Yankai, P. Manosan. (2009) Reliability Of The Universal And Invented Gravity Goniometers In Measuring Active Cervical Range Of Motion In Normal Healthy Subjects, *International Journal Of Applied Biomedical Engineering*; 2:49-53.
- [16] Birgitta Helmerson Ackelman, Urban Lindgren. (2002), Validity And Reliability Of A Modified Version Of Neck Disability Index, *J Rehabil Med*; 34: 284–87.
- [17] ***Bowen Therapy A New Treatment Modality For Pain Management In Occupational Therapy, Bowen Therapy Special Interest Group, Hong Kong Occupational Therapy Association.
- [18] Michelle Marr, Julian Baker, Nicky Lambon et. al. (2011) The Effect Of The Bowen Technique On Hamstring Flexibility Over Time, *Journal Of Bodywork And Movement Therapy*; 15:281-290.
- [19] B. Carter. (2001), Effectiveness of Bowen Technique In The Management Of Clients Frozen Shoulder, *Complementary Therapies In Medicine*; 9,208-215.

A COMPARATIVE STUDY ON THE EFFECTIVENESS OF CORE STABILITY EXERCISE AND PELVIC PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON BALANCE, MOTOR RECOVERY AND FUNCTION IN HEMIPARETIC PATIENTS: A RANDOMIZED CLINICAL TRIAL

STUDIU COMPARATIV PRIVIND EFICIENȚA EXERCIȚIILOR DE STABILITATE POSTURALĂ ȘI FACILITARE NEUROMUSCULARĂ PROPRIOCEPTIVĂ PELVINĂ ASUPRA ECHILIBRULUI, A RECUPERĂRII MOTORII ȘI FUNCȚIEI, LA PACIENȚII CU HEMIPAREZĂ: STUDIU CLINIC RANDOMIZAT

Jeba Chitra³. Rishabh Sharan⁴

Keywords: core stability exercise, pelvic proprioceptive neuromuscular facilitation, balance, motor recovery, function

Abstract.

Introduction: Development of good trunk stability to promote balance to perform activities is often neglected in stroke-rehabilitation. Evidence state that core stability exercise and Pelvic Proprioceptive Neuromuscular Facilitation(PNF) are effective in improving balance and gait function in hemiparetic patients. **Objective:** The aim is to evaluate the comparative effectiveness of core stability exercise and Pelvic PNF on balance, motor recovery and function in hemiparetic patients. **Procedure:** 30 post-stroke subjects diagnosed with first unilateral stroke with onset less than 6 months were randomized into Core Stability Exercise Group(A) and Pelvic-PNF Group(B), and underwent 45minutes training along with conventional therapy per day, 3days/week, for 4weeks. All subjects were evaluated for Berg Balance Scale(BBS), Motor Assessment Scale(MAS), and Functional Independence Measure Scale(FIMS) pre and post intervention. Results: Following intervention, Pelvic PNF showed more statistical significant improvement in FIMS than Core Stability Exercise. However no statistical difference was observed in terms of balance and motor recovery between the groups. Conclusion: Focus on trunk control training should also be used initially in stroke-rehabilitation which is an effective way to improve balance, motor recovery and function. Core stability exercise and Pelvic PNF are equally effective in improving balance and motor recovery whereas; Pelvic PNF is more efficient compared to core stability exercise to improve function.

Cuvinte cheie: exerciții postural, facilitare neuroproprioceptivă proprioceptive pelvină, echilibru, recuperare motorie, funcție

Rezumat.

Creștererea stabilității trunchiului pentru obținerea echilibrului în vederea desfășurării activităților cotidiene, este adesea neglijată la pacienții cu hemiplegie. Studiile demonstrează că exercițiile pentru stabilitatea trunchiului facilitarea si neuroproprioceptivă pelvină sunt eficiente în îmbunătățirea echilibrului și a mersului, la pacientul hemiplegic. Obiective: Scopul este de a evalua eficiența exercițiilor posturale și a FNP pelvin în îmbunătățirea echilibrului, funcției motorii și mersului la pacientul hemiplegic. Procedură: 30 pacienți post AVC, cu mai puțin de 6 luni de la instalare, au fost împărțiți în grupul care urmează exerciții pentru postură (grup A) și grupul care practică FNP pelvin (grup B). Ambele grupe mai fac 45 minute de fizioterapie convențională de 3 ori/zi, 4 săptămâni. Pentru evaluare s-a flosit scala Berg (BBS), Motor Assessment Scale (MAS), și Functional Independence Measure Scale (FIMS) pre and post intervenție. Rezultate: După intervenție, s-a constatat o îmbunătățire semnificativă a funcției la grupuul FNP pelvin, comparative cu grupul A. Nu s-au obdervat diferențe semnificative în ceea ce privește echilibrul și recuperarea motorie. Concluzii: Inițial, în tratament se va pune accent pe stabilitatea trunchiului, eficientă în recuperarea motorie, a echilibrului și mersului. Exercițiile posturale și FNP pelvin sunt eficiente în egală măsură în îmbunătățirea echilibrului și recuperarea motorie. FNP pelvin este totuși mai eficient în recuperarea funcției.

⁴ Post-graduate student, Department of Neuro-Physiotherapy, KLEU Institute of Physiotherapy, Belagavi, Karnataka. India. Ph.No: +919590789313. email: rishabh.sharan3@gmail.com

³ Associate Professor, Department of Neuro - Physiotherapy, KLEU Institute of Physiotherapy, Belagavi, India. **Correspondent Author**: Ph.No: +919886510290. email: jebachitra@hotmail.com

Introduction

Stroke is a global health problem that is the second commonest cause of death and fourth leading cause of disability worldwide.[1]Stroke or brain attack is a sudden loss of neurological function caused by an interruption of the blood flow to the brain.[2] WHO defines Stroke as 'The rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin'.[1]

The Global estimate of Stroke was 400-800 per 100,000 every year with mortality of 5.7 million; approximately 16 million cases of acute strokes every year and about 28,500,000 Disability Adjusted Life-Year. The prevalence of Stroke in India was 90-222 per 1,00,000 with mortality of 1,02,620 million and approximately 1.44-1.64 million cases of acute stroke added every year and 6,398,000 Disability Adjusted Life-Year. Overall in India, the adjusted annual incidence (per 1,00,000 persons) of stroke is 124 in rural area and 145 in urban area.³ In developed countries, Stroke is the first leading cause for disability and 15% - 30% being permanently disabled. It is also a leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months. Stroke is a life-changing event that affects not only the person who may be disabled, but their family and caregiver's life.[1]

The most common clinical symptom of stroke is motor weakness (hemiparesis), or paralysis (hemiplegia) with loss of balance or coordination, leading to difficulty in walking.[1,2,3] Impaired postural control is a key characteristic of the mobility problems in stroke patients. It is caused by a complex interplay of motor, sensory and cognitive impairments.[4] Many hemiplegic patients with stroke shift their center of gravity (COG) to the unaffected side when maintaining a quiet stance and show left-right asymmetry in motor function; with decreased balance ability.[5] Good trunk stability is an essential component for balance and the use of extremities while performing daily functional activities with higher level tasks.[6]

Motor recovery is regaining the previously lost motor function seen in the form of improvement in the motor performance or activities in CVA patients. It occurs predominantly in the earlier months following stroke, although some patients may show considerable recovery in later phases. The most important predictor for motor recovery is the initial grade of paresis.

While some patients may show complete recovery, in others the degree of paresis may not change at all. It is difficult to determine a precise time window for motor recovery in individual patients.[7]

Functional recovery is improvement observed in the activities of daily living which may be influenced by a range of biological and environmental factors, and recoveries profiles are characterized by a high inter individual variability. A recent critical review indicated that several clinical and demographic variables may be valid predictors of general functional recovery. This includes neurological factors such as consciousness at onset, disorientation, sitting balance, and severity of motor deficits.[7] Only 12% of the patients with stroke are independent in basic activities of daily living (ADL) at the end of the first week.[8]

Core muscles serve as a muscular corset that works as a unit to stabilize the body and spine, with or without limb movements referred as the "powerhouse", the foundation or engine of all limb movement.[9] It enhances proper load balance within the spine, pelvis, and kinetic chain.[10] The patients with stroke need to rebuild core stability in order to attain proper postures of the lumbar and pelvic regions during activities.[11] Recent studies suggest that the core stability exercises are effective in improving the muscle activity of the lower trunk thereby enhancing trunk control, balance and gait functions in stroke patients.[12,13]

Proprioceptive Neuromuscular Facilitation (PNF) is a method to facilitate or increase the reactions of neuromuscular mechanisms through proprioceptive stimuli.[14] PNF is a therapeutic exercise for stroke to stretch and strengthen the muscles, and train them in functional activities. It is frequently used as an alternative to progressive resistance exercises in order to avoid injury in stroke patients.[15] As pelvis is the "key point of control" for maintaining a gait pattern, hence techniques designed to affect the pelvis are commonly used among PNF techniques.[16,17,18]

Post stroke rehabilitation mainly emphasizes to restore the arm function and independence in gait and to some extent the focus on development of good trunk stability to promote balance to perform activities of daily living is neglected in the stroke-rehabilitation. [6]

Evidence state that core stability exercises and Pelvic PNF are effective in improving balance and gait function in hemiparetic patients. However, there are no studies that have evaluated the effect of these exercises in terms of motor recovery and functional outcome measures. Hence this study is undertaken to compare the effectiveness of core stability exercise and Pelvic PNF on balance, motor recovery and function in hemiparetic patients.

Methods

Participants

Prior to the commencement of the study, approval was obtained from the Ethical Committee of the Institution Review Board. 52 post-stroke subjects from Secondary and Tertiary Care Hospitals in Belagavi were screened for the study. 30 patients were recruited based on the inclusion and exclusion criteria. Patients should also be willing to receive intervention for a minimum of 12 sessions for 4 weeks duration. The participants were briefed about the nature of the study and informed consent was taken. The participants were randomized into two groups: Group A (n=15) where core stability exercise was given and group B (n=15) Pelvic PNF, using the lottery method. The inclusion criteria included participants diagnosed with first unilateral stroke with onset less than 6 months, age between 45 to 70 years, able to ambulate 10 meters with or without walking aids, Mini-Mental State Examination score greater than 24/30. The exclusion criteria were neurological disease affecting balance other than a stroke, such as cerebellar disease, Parkinson's disease and/or a vestibular lesion. Recent surgeries of abdomen & pelvis fracture less than 6 months, medically unstable, musculoskeletal disorders such as low backache, arthritis or degenerative diseases of the lower limbs affecting motor performance.

Outcome Measures

The outcome measures of Berg Balance Scale (BBS), Motor Assessment Scale (MAS), and Functional Independence Measure Scale (FIMS) was collected pre and post 4 weeks.

Berg Balance scale: The scale is a 5-point ordinal scale to assess balance, ranging from 0 to 4 with higher scores given on the basis of speed, stability or degree of assistance required for completion of the task. The task scores are summed to give a total score out of a possible 56 points with higher scores representing better balance. The BBS is psychometrically sound measure of balance impairment for use in post stroke assessment.[19]

Motor Assessment Scale: The test is designed to assess the motor recovery and return of function following a stroke or other neurological impairment. Each item is scored on a scale ranging from 0 to 6 pertaining to upper extremity motor recovery, balance, and function. Higher the score higher will be the functioning of the patient on the affected side. [20]

<u>Functional Independence Measure Scale:</u> The 18 items on the FIM assess the patient's degree of independence in function. Thirteen items define disability in motor functions and five define disability in cognitive functions. Each item is rated on a 7-point scale, with 1 = total assist (<25% independence) and 7 = complete independence (100% independence). Ratings are added to all the items and are used to determine the degree of help the patient needs to carry out basic, routine daily tasks.[21]

Intervention

Both the groups participated in 30 minutes of conventional therapy and 30 minutes of core stability exercise or Pelvic PNF. Conventional therapy included stretching and strengthening exercises for upper and lower extremities, techniques to normalize tone and weight bearing exercises, active functional training for postural and functional control.[2] Group A received core stabilization exercises where participants were taught to contract multifidus and

transverse abdominus before the commencement of exercise, which was expected to be in a contracted state during the exercise program. The exercises included curl-ups with straight reaching, curl-ups with diagonal reaching, bridging, bridging with legs crossed, bridging with one leg, bird dog exercise, and side bridging. [12,13] Group B received Pelvic PNF which included 10 minutes each of rhythmic initiation, slow reversal, and agonistic reversals applied to the pelvic region. The procedures were done to facilitate anterior elevation and posterior depression of pelvic movement in a side-lying position which allows free motion of the pelvis.

The element of PNF such as manual contact, stretch, resistance, and verbal cuing was incorporated into the treatment session. Stretch was applied immediately and gently after the target muscle had been fully lengthened by relaxing the muscle before the subject started to move. For anterior elevation the contra lateral internal and external oblique abdominal muscle and for posterior depression internal and external oblique abdominal muscle was stretched. [16,17,18]

Results

The primary data of the study was analyzed in terms of improvement in the scores of BBS, MAS and FIMS after four weeks of intervention program. Intra and inter group differences were compared so as to evaluate the effectiveness of the two treatment techniques under consideration in the present study. Statistical analysis was done using the statistical software SPSS version 21.0. Demographic data was analyzed using paired - t test for age, Body Mass Index (BMI) and duration of stroke and chi square test for gender and affected side distribution.

For the outcome measures paired - t test was used with p value less than 0.05 (p<0.05) as statistical significance. Demographic characteristics of both the groups are shown in Table 1.

The pre-test mean in BBS of group A was 20.87 ± 6.19 and post-test was 29.40 ± 7.58 with a difference of 8.53 ± 5.58 which was statistically significant(p=0.00001). The pre-test mean of group B was 27.80 ± 9.24 and post-test was 37.87 ± 7.68 with a difference of 10.07 ± 5.23 which was statistically significant (p=0.00001). The group A showed better improvement compared to group B which was not statistically significant (p=0.4439).

The pre-test mean in MAS of group A was 25.53 ± 5.60 and post-test was 40.67 ± 7.49 with a difference of 15.13 ± 4.94 which was statistically significant(p=0.00001). The pre-test mean of group B was 25.53 ± 3.96 and post-test was 43.20 ± 3.65 with a difference of 17.87 ± 3.60 which was statistically significant (p=0.00001). Between the groups, the score was not statistically significant (p=0.0944) but group B showed better improvement compared to group A.

The pre-test mean in FIMS of group A was 80.67 ± 10.69 and post-test was 101.87 ± 15.97 with a difference of and 21.20 ± 9.80 which was statistically significant (p=0.00001). The pre-test mean of group B was 84.07 ± 13.40 and post-test was 112 ± 7.5 with a difference of 27.93 ± 8.14 which was statistically significant (p=0.00001). The group B showed better improvement compared to group A which was statistically significant (p=0.05). (Table 2)

TABLE 1: Demographic characteristics of both the groups.

| Demographic Data | Group A | Group B | p-Value |
|-----------------------------|------------|------------|---------|
| Age (years) | 52.07±5.98 | 55.27±8.25 | 0.2341 |
| BMI | 26.01±4.6 | 24.77±4.43 | 0.4571 |
| Duration of stroke (months) | 1.20±1.72 | 2.67±2.53 | 0.0736 |
| Gender: Male/ Female | 13/2 | 12/3 | 0.6242 |
| Side affected: right/left | 9/6 | 11/4 | 0.4397 |

TABLE 2: Intra and Inter values of Outcome Measures of both the groups (*p<0.05, paired t test)

| OUTCOME | VALUES | DIFFERENCE IN VALUES | PERECENTAG |
|---------|--------|----------------------|------------|
| | | | |

| MEASUF | MEASURES | | | | | | | | | E OF CHANGE | | |
|--|----------|------------------|-----------------|-----------------|------------|-----------|--------|------------|-----------|------------------|------------------|--|
| | | | GRO | t | р | GR | GRO | t | р | GRO UP A | GRO UP B | |
| | | GROU P A | UP B | VAL UE | VAL UE | OUP A | UP B | VAL UE | VAL UE | (p VALU E) | (p VALU E) | |
| MAS (Motor Assessment Scale) | PRE | 25.53 ± 5.6 | 25.53 ± 3.96 | 0.112 9 | 0.910 9 | 15.1 | 17.87 | - | 0.094 | 59.27 % | 70.53 | |
| | POST | 40.67 ± 7.49 | 43.2 ± 3.65 | - 1.177 7 | 0.248 8 | 3 ± 4.94 | ± 3.6 | 1.731 | 4 | (0.000 01*) | (0.000 01*) | |
| BBS (Berg | PRE | 20.87 ± 6.19 | 27.8 ± 9.24 | 2.414 1 | 0.022 6 | 8.53 ± | 10.07 | - 0.776 | 0.443 | 40.89 | 36.21 | |
| Balance Scale) | POST | 29.4 ± 7.58 | 37.87 ± 7.68 | 3.039 6 | 0.005 | 5.58 | +5.23 | 6 | 9 | (0.000 01*) | (0.000 01*) | |
| FIMS (Functional | PRE | 80.67 ± 10.69 | 84.07 ± 13.4 | - 0.768 | 0.448 9 | 21.2 | 27.93 | - | 0.05 | 26.28 % | 33.23 | |
| Independenc e Measure Scale) | POST | 101.87± 15.97 | 112 ± 7.5 | 2.224 | 0.034 4 | ± 9.8 | ± 8.14 | 2.049 | 0.05 | (0.000 01*) | (0.000 01*) | |

Discussion

The Randomized Clinical Trial was conducted to compare the effectiveness of core stability exercise and Pelvic PNF on balance, motor recovery and function in hemiparetic stroke patients. All the subjects showed no statistical difference in age, gender, BMI, and side affected in both the groups which represent homogeneity of the patients.

The study showed significant improvement in pre and post-intervention score of the core stability exercise and Pelvic PNF when evaluated by BBS. However between the groups the score was not statistically significant and core stability exercise showed better improvement compared to Pelvic PNF. Core training apparently improved the balance of the lumbo-pelvic-hip complex, corrected postural alignments, therefore it could have led to a gradual improvement in balance in the BBS. Core stability exercises lead to stabilization of the trunk by strengthening the lumbar musculature and improving trunk control which resulted in correction of the shift of COG from the unaffected side back to the center. In a pilot study conducted to investigate the effect of core exercises on balance and selective trunk movement in hemiplegics, a significant improvement in sitting balance was noted on trunk performance.[22] As stated in the literature, Pelvic PNF not only exercises the pelvis motion and stability but also facilitates trunk motion and stability.PNF might have improved the flexibility, muscle strength, neural control, and proprioception contributing to a better postural control and dynamic stability.[14]

There was significant improvement in pre and post-intervention score of the core stability exercise and Pelvic PNF when evaluated by MAS to measure the motor recovery. However no significant difference was observed between the groups but Pelvic PNF showed better improvement compared to core stability exercise. The improvement shown in the Pelvic PNF group was because of focus of this approach on upgrading of the lost motor capacities. It could also have led to the facilitation of trunk control by the application of stretch, use of particular movement patterns and use of maximal resistance in order to induce irradiation indirectly to upper trunk & cervical areas. This may be the reason for the improvement in the level of motor recovery. Kabat reported that a greater motor response can be attained when facilitating techniques are employed in addition to resistance which could have lead to an improved motor recovery in our study.[14,16] The improvement in the motor performance in core stability exercise could be due to the repeated contraction of the core muscles of the spine thereby

increasing strength and stability of trunk. This might have lead to plasticity of the sensorimotor regions of the central nervous system. Similar results were shown by a study to verify the effects of a 4-week core stability-enhancing exercise where core control ability was evaluated using TIS and surface electromyography. Significant difference was found in the TIS score and increased activation of the core muscles of patients with hemiplegia was recorded on surface electromyography.[13]

Both the techniques core stability exercise and Pelvic PNF showed significant improvement in pre and post intervention scores in the function when evaluated by of FIMS. Pelvic PNF may possibly improve functional independency through increased emphasis on symmetry between the affected and non affected side and induces patients to use the affected extremities voluntarily. The improved balance had aided in functional recovery and decrease dependency in ADLs. The Pelvic PNF resulted in more significant improvement and was effective in improving function than core stability exercise. The techniques used were Repeated Stretch technique which helps to strengthen trunk muscles. Reversal of Antagonist technique trains coordination and can prevent or reduce fatigue of the working muscles and Rhythmic Stabilization technique applied to lower trunk and pelvic stability which might have helped in improving the control of the pelvis. As pelvic motion and stability is required for proper function of the trunk and lower extremities during different activities. The Pelvic elevation patterns facilitate stepping or leg lifting motions and pelvic depression patterns facilitate weight bearing motions of the leg which are prerequisites for normal function. [14] Trunk control is the ability of the core muscles to maintain an upright posture, regulate weight shifts and perform selective movements.[4] The techniques used in core stability exercise might have helped to improve function by maintaining selective movement control which is altered in patients with stroke due to the order of muscle movement. This results in malfunctioning movement pattern with increased energy expenditure. The limitation of the study was that a long term follow up could not be assessed.

Conclusion

Instead of concentrating only on the limbs, focus on trunk control training should also be used initially in stroke-rehabilitation that is an effective way to improve balance, motor recovery and function. Core stability exercise and Pelvic PNF are equally effective in improving balance and motor recovery whereas; Pelvic PNF is more efficient compared to core stability exercise to improve function.

Future scope

Multicentre trials with long-term follow-up can be carried out to check the carry over effect. Outcome measure to evaluate quality of life can be considered.

Acknowledgement

We acknowledge the cooperation extended by the secondary and tertiary health care hospitals, and patients for their support and help throughout the study.

Conflict of interest

None

Reference:

- [1] Taylor F.C, Kumar S. (2012), Stroke in India Factsheet. South Asia Network for Chronic Disease, IIPH Hyderabad, *Public Health Foundation of India*.
- [2] O Sullivan S, Schmitz T. (2007), Physical Rehabilitation: Assessment And Treatment. 5th edition, *Jaypee Brothers*, New Delhi.
- [3] Umfred DarcyA. (1990), Neurological Rehabilitation. 2nd edition, *Mosby Elsevier* USA.
- [4] Karthikbabu S, Chakrapani M, Ganeshan S, Rakshith KC, Nafeez S, Prem V. (2012), A review on

- assessment and treatment of trunk in stroke: a need or luxury. Neural Regen Res; 7(25):1974-1977
- [5] Suzuki M, Fujisawa H, Machida Y, Minakata S. (2013), Relationship between the Berg Balance Scale and Static Balance Test in Hemiplegic Patients with Stroke, *J. Phys. Ther. Sci.* 25: 1043–1049.
- [6] Ryerson S, Byl NN, Brown DA, Wong RA, Hidler JM. (2008), Altered trunk position sense and its relation to balance functions in people post-stroke. *J Neurol Phys Ther*; 32:14-20.
- [7] Hendricks HT, van Limbeek J, Geurts AC, Zwarts MJ. (2002), Motor recovery after stroke: a systematic review of the literature. *Arch Phys Med Rehabil*; 83:1629-37.
- [8] Veerbeek JM, van Wegen E, van Peppen R, van der Wees PJ, Hendriks E, et al. (2014), What Is the Evidence for Physical Therapy Poststroke? A Systematic Review and Meta-Analysis. *PLOS ONE*; 9(2).
- [9] Akuthota V, Nadler SF. (2004), Core strengthening. Arch Phys Med Rehabil, 85: S86–S92.
- [10] Akuthota V, Ferreiro A, Moore T, Fredericson M. (2008), Core Stability Exercise Principles. *Current Sports Medicine Reports*; 7: 39-44.
- [11] Hodges PW, Richardson CA. (1997), Contraction of the abdominal muscles associated with movement of the lower limb. *Phys Ther*; 77:132-142.
- [12] Eun-Jung C, Jung-Hee K, Byoung-Hee L. (2013), The effects of core stabilization exercise on dynamic balance and gait function in stroke patients. *J Phys. Therapyer. Sci*; 25(7).
- [13] Yu H, Seong P. (2013), The effects of core stability strength exercise on muscle activity and trunk impairment scale in stroke patients. *Journal of Exercise Rehabilitation*; 9(3):362-367.
- [14] Adler SS, Beckers D and Buck M, (2008), PNF in Practice, An Illustrated Guide. 3rd edition. *Germany: Springer Publication*.
- [15] Kumar S, Kumar A, Kaur J,(2012), Effect of PNF Technique on Gait Parameters and Functional Mobility in Hemiparetic Patients *Journal of Exercise Science and Physiotherapy*, 8, 2: 67-73, 2012.
- [16] Khanal D, Singaravelan R.M., Khatri S M. (2013), Effectiveness of Pelvic Proprioceptive Neuromuscular Facilitation Technique On Facilitation Of Trunk Movement In Hemiparetic Stroke Patients. *IOSR Journal of Dental and Medical Sciences*. 3, 6, 29-37.
- [17] Ray-Yau W. (1994), Effect of Proprioceptive Neuromuscular Facilitation on the gait of patients with hemiplegia of short and long duration, *PHYS THER*. 74; 1108-1115.
- [18] Trueblood P R, Walker JM, Perry J, Gronley JK. (1989), Pelvic exercise and gait in hemiplegia, *PHYS THER*. 69; 18-26.
- [19] Stevenson TJ. (2001), Detecting change in patients with stroke using the Berg Balance Scale. *Australian Journal of Physiotherapy* 47: 29-38.
- [20] Dean CM and Mackey FH. (1992), Motor assessment scale scores as a measure of rehabilitation outcome following stroke. *Australian Journal of Physiotherapy* 38: 31-35.
- [21] Chumney D, Nollinger K, Shesko K, Skop K, Spencer M, Newton RA.(2010), Ability of Functional Independence Measure to accurately predict functional outcome of stroke-specific population: Systematic review *Journal of Rehabilitation Research & Development*; 47(1), 17–30.
- [22] Verheyden G, Vereeck L, Truijen S, Troch M, Lafosse C, Saeys W, Leenaerts E et.al. (2009), Additional exercises improve trunk performance after stroke: a pilot randomized controlled trial. *Neurorehabil Neural Repair*; 23:281-286.

A SYSTEMATIC REVIEW ON BEHAVIORAL AND PHYSICAL TREATMENT APPROACHES FOR MANAGEMENT OF MIGRAINE

RECENZIE PRIVIND ABORDĂRILE TERAPEUTICE COMPORTAMENTALE ȘI PSIHICE PENTRU MANAGEMENTUL MIGRENEI

Manoj Malik⁵, Shailendra Kumar Singh⁶, Narkeesh Arumugam⁷

Keywords: migraine, behavioral therapy, physiotherapy, biofeedback, manual therapy, transcranial direct current stimulation.

Cuvinte cheie: migrenă, terapie comportamentală, psihoterapie, biofeedback, terapie manuală, stimulare cu current transcranial direct

Abstract

Introduction. Migraine is a common episodic headache syndrome with an estimated prevalence of 11% in adult population worldwide. Migraine is usually managed by medications although some patients have contradiction or suffer from side effects associated with certain medications. Therefore establishing non pharmacological neuromodulatory approach as an alternative treatment option shall be highly solicited.

Objective. The objective of this study is to systematically review experimental studies, preferably randomized controlled trials on Non Pharmacological management of migraine.

Methods. Comprehensive Computerized search was done. Review was performed according to the Preferred Reporting items for systematic review and Meta Analysis (PRISMA).

Results. Results suggest that treatments like Behavioral therapy, Biofeedback, Transcranial Direct Current Stimulation (TDCS) as well as exercises and diet restriction are effective tools in the management of migraine and other associated symptoms.

Conclusion. Non Pharmacological Techniques can be a safer alternative in Management of migraine and related symptoms

Abbreviations - TDCS - Transcranial Direct Current Stimulation, CSD-Cortical Spreading Depression, PRISMA-Preferred Reporting items for systematic review and Meta Analysis, ICHD-International Classification of Headache Disorders, MIDAS-Migraine Disability Assessment, MADR S-Montgomery Asberg Depression Scale, EEG-Electroencephalogram

Rezumat

Introducere. Migrena este un sindrom comun de durere de cap cu o prevalență estimată de 11% în populația lumii. Migrena se tratează de obicei cu medicație, cu toate că unii pacienți au contraindicații sau suferă de efecte secundare associate cu unele medicamente. De aceea, stabilirea unei abordări nemedicamentoase, neuromodulatorii, ca tratament alternativ, este foarte binevenită.

Obiective. Obiectivul acestui studiu este de a recenza sistematic studii experimentale, de preferat randomizate, privind managementul nonfarmacologic al migrenei.

Metode. S-a efectuat o cercetare comprehensive computerizată. Recenzia s-a realizat în conform itemilor de Raportare Preferențială pentru studii de recenzie și Meta-analiză (PRISMA).

Rezultate. Rezultatele indică faptul că tratamente precum terapia comoprtamentală, biofeedback, stimulare cu curent direct transcranial, precum și exercițiile și dieta restrictivă sunt eficiente în managementul migrenei și simptomelor asociate. Concluzie. Tehnicile nonfarmacologice pot fi o alternative sigură în managementul migrenei și simptomelor associate.

Abrevieri - TDCS - Transcranial Direct Current Stimulation, CSD-Cortical Spreading Depression, PRISMA - Preferred Reporting items for systematic review and Meta Analysis, ICHD - International Classification of Headache Disorders, MIDAS-Migraine Disability Assessment, MADR S-Montgomery Asberg Depression Scale, EEG-Electroencephalogram

Introduction

_

Corresponding Author E-mail- malik_manoj@yahoo.com

⁵ Assistant Professor, Department of Physiotherapy, Guru Jambheshwar University of Science and Technology, Hisar

⁶ Chairman, Department of Physiotherapy and Professor, Pharmaceutical Sciences, Guru Jambheswar University of Science and Technology, Hisar, E-mail- sksingh gju@rediffmail.com

⁷ Head and Professor, Department of Physiotherapy, Punjabi University, Patiala, E-mail- narkeesh@gmail.com

Migraine is a common episodic headache syndrome significantly affecting quality of life with estimated prevalence in 11% adult population across the globe.[1] Migraine interferes in many facets of people's daily life including employment commitment and their ability to look after their families resulting in reduced quality of life.[2]Migraine is very common, highly disabling and extremely costly. The World Health Organization ranks migraine among the top twenty causes of disability worldwide. [3] In the global burden of disease survey 2010, it was ranked as the third most prevalent disorder and 7th highest specific cause of disability worldwide.[22] The symptoms of migraine arise from a combination of vascular and neurological events occurring in the cranial meninges and therefore, this disorder is often described as being of neurovascular origin. During attacks of classic migraine, regional cerebral blood flow shows a mild cortical hypo-perfusion that begins in the visual cortex and spreads forward at a rate of 2 to 3 mm per min.[4] Cortical spreading depression (CSD) is an intense wave that propagates across the cerebral cortex at a rate of 2-5 mm per minute and lasting for 15 to 30 minutes which causes disruption of ionic gradients followed by a period of suppressed neural activity. [5.6] Both the migraine aura and CSD propagate along the cortical surface. CSD is one of the most significant mechanism underlying migraine owing to the characteristic spread and sequence of each symptom as reported by migraine patients. [7] CSD triggers the trigeminal vascular system, which in turn releases nitric oxide and calcitonin gene related peptide thus inducing vasodilatation and perivascular nerve activity.[8] The pain of migraine is invariably accompanied by features like nausea, vomiting, photophobia, phonophobia etc. This may be associated with localized edema of the scalp or face, scalp tenderness prominence of a vein or artery of the temple, or stiffness and tenderness of neck.[9]Migraine is a complex combination of biological, behavioral and emotional components, the most effective treatment programs include a combination of pharmacological and non-pharmacological approaches. [10] Moreover, patients with migraine are often refractory to medical management and there are a number of adverse effects of pharmacological management of Migraine. Therefore they might need other strategies to modulate their pain and other symptoms. The present review is an effort to document available literature regarding behavioral and physical treatment for management of Migraine

Purpose

Purpose of this review is to provide a brief and succinct summary of scientific evidence regarding the non pharmacological management of migraine.

Methodology

Intially, Literature search was done by comprehensive computerized search on Pubmed, Biomed central, Google Scholar, Springer link and Oxford Press. Review was performed according to PRISMA.PRISMA statement was published in 2009 in order to set standards in the reporting of systematic reviews and meta-analyses. Step Wise flow diagram of PRISMA is shown in figure 1. Search words were 'Migraine and Manual therapy' 'Migraine and Physical therapy', 'Migraine and Biofeedback', 'Migraine and Behavioral therapy', 'Behavioral Management of Migraine', 'Migraine and Acupuncture', and 'Non Pharmacological management of Migraine'. We also examined references of these studies and of earlier reviews. Only Randomized controlled trials and comparative studies preferably following International Classification of Headache Disorder criteria for migraine specified by International Headache Society as inclusion criteria for participants were included in the review. Although observational studies and case reports can yield relevant evidence, primary purpose of this review was to summarize the results of studies designed to evaluate efficacy and relative efficiency, therefore review was restricted to comparative studies preferably Randomized Controlled Trials.

Diagnosis

A number of criterion have been utilized for diagnosis of Migraine. Migraine was diagnosed in twenty one studies by ICHD Criteria specified by International Headache Society. In one study inclusion criteria specified by Diamond and Delassio was used for diagnosis of Migraine. One study included subjects diagnosed by the Project Neurologist using diagnostic criteria of intermittent paroxysmal headaches with any two of four symptoms of throbbing pain or related neurological phenomena, nausea and/or vomiting and positive family history and one study included patients with self-reported diagnosis.

Outcome measures

Most commonly used outcome measures were migraine pain intensity (17 Studies), frequency (14 studies) and duration (8 studies). Visual Analog Scale was most common assessment tool (used in 5 studies) for evaluating headache intensity. Headache diary was used to record headache frequency and duration of attacks. Medications used were taken as an outcome measure in six studies. Two studies used Migraine Disability Assessment (MIDAS) questionnaire as an outcome measure while one study used Pediatric MIDAS as an outcome measure. Scales like Patient global assessment (one study), Clinical global Impression (one study) PQ23 Quality of life scale (one study) were also used as outcome measures. Anxiety and depression were also used as an indicator of treatment outcome with studies using Anxiety and depression rating scales like Hamilton rating scale for anxiety and depression, Speilberger state anxiety inventory and MADR S Depression inventory as Outcome measures. Visual evoked potential and LASER evoked potentials were used as outcome measures in one study each.

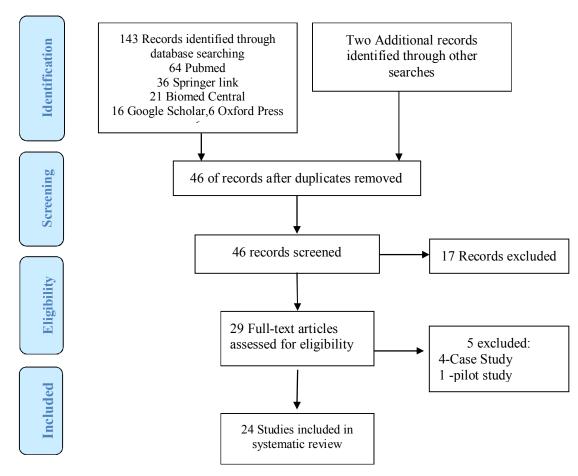


Figure 1: PRISMA Flow Diagram

Treatment interventions

including thermal Biofeedback, TDCS was used in three studies. Biofeedback (EEG) Biofeedback, Electroencephalogram Passive Infrared Hemoencephalography Biofeedback, Hand warming Biofeedback, EEG Biofeedback and Biofeedback assisted relaxation training was given in five studies. Alvin lake et al used Biofeedback combined with rational emotive therapy in one of the three groups. RCT done by Peter J Tuchin et al applied Chiropractic spinal Manipulative therapy in migraine patients. Effect of Exercises (one study) and Diet restriction based on IgG Food elimination (two studies) on Migraine patient is also reported. Behavioral Migraine management was done in six studies and included Internet Based Multimodal Behavioral treatment (one study), Behavioral Migraine management, Web based behavioral interventions, Cognitive behavioral self management strategy, Relaxation Training and Written Emotional Disclosure and progressive deep muscle relaxation and Cognitive restructuring. Efficacy of High frequency transcranial Magnetic stimulation in Migraine Management was done in one study. Other studies which were included used Neck Cooling, Yoga, Acupressure, massage therapy and massage combined with cervical and upper thoracic manipulations.

Results

Transcranial Direct Current stimulation-Results of studies included in present review indicate that TDCS may be safe and useful in migraine prophylaxis and in reducing migraine frequency and medication intake.

Biofeedback-Biofeedback may be effective in decreasing migraine frequency, improvement in headaches and altering mood states in Migraine. However type of biofeedback and combination with other therapies significantly alters treatment outcomes.

Spinal Manipulative therapy –Spinal manipulative therapy may result in improvement in migraine frequency, duration, disability and medication use in migraine patients. Cervical spine manipulation may significantly reduce headache pain intensity. Massage to trapezius significantly decreases pain and frequency of Headaches.

Diet and exercises-Exercise may be an option for prophylaxis of Migraine. Studies done on food elimination based on IgG antibodies have conflicting results. It may be an effective strategy in reducing migraine frequency.

Behavioral management of Migraine-Behavioral management is effective in treatment of Migraine. It also improves self efficacy in management of migraine. Internet based or CD ROM based behavioral techniques are easy to administer and are effective in improving Migraine related symptoms. Relaxation training and cognitive restructuring helps in reducing headache frequency. Relaxation training is also effective in improving pain severity in Migraine patients. Transcranial Magnetic Stimulation-Results suggest that High frequency transcranial Magnetic Stimulation and sham procedure can both modulate pain in Migraine patients.

Other treatment Methods like neck cooling, yoga, massage therapy, acupressure and Anthrophosphic therapy may be effective.

Summary of included studies is shown in Table 1.

REVISTA ROMÂNĂ DE KINETOTERAPIE

| S. No | Author | Design | n | Treatment applied | Outcome Measures | No. of Sessions/Stu dy Duration | Follow up | Results | Diagnostic Criteria |
|----------|--|---|----|--|--|--|--|---|---|
| 1 | Alexandre F Dasilva et al[11],2012 | Randomized, single blinded with external blinded rater, placebo controlled clinical trial | 13 | Anodal TDCS Sham TDCS | Primary Outcome measure VAS Secondary Outcome Measure-Length of Migraine Episodes, patient global assessment(PGA) and Clinical Global Impression(CGI) | 10 Sessions over a four week Duration | 60 and 120 days after end of treatment | Patients with Chronic Migraine have a positive but delayed response to anodal TDCS of primary motor cortex | ICHD Criteria specified by IHS |
| 2 | Alessandro Vigano et al[12] 2013 | Randomized Controlled Trial | 10 | Anodal TDCS | Pattern Reversal-VEP, First Block Amplitude and Migraine Frequency, Average Cumulative attack Duration, Average acute treatment intake and duration of each attack | 16 sessions ,twice a week for 8 weeks | Prospective follow up 2 months | 15 minutes Session of Anodal TDCS over the visual cortex is able to transiently increase habituation in healthy Volunteers Significant reduction in Migraine frequency, days, pain killer intake and attack Duration | ICHD Criteria specified by IHS |
| 3 | Paradee Auvichayap at et al[1] 2012 | Randomized Placebo Controlled trial | 37 | Anodal TDCS | Headache Diary, attack Frequency, Pain intensity, Dosage of Abortive medications | 20 days Double blind Treatment sessions | Pre treatment 4 week baseline evaluation ,post treatment 12 week period of observation | Anodal M1 TDCS may be safe and useful clinical tool in Migraine Prophylaxis | ICHD Criteria specified by IHS |
| 4 | J Michael Lacorix et al[13]1983 | Comparative Study | 27 | Thermal Biofeedback,Fron talis EMG Biofeedback and Relaxation Training | Structured interview for headache Characteristics and global 5 point self rating scale of improvement | 18 Training and six test sessions | Six months after training | Improvement in headaches was observed in all groups. Best improvement took place in thermal Biofeedback group | Criteria specified by Diamond and Delassio |
| 5 | Eun Ho Kang et al[14]2009 | Randomized Controlled Trial | 32 | Biofeedback Assisted Relaxation | Primary Outcome measure was Headache severity on a 6 point scale for 7 consecutive days as headache | 8 sessions of biofeedback assisted | Outcome measure recorded at | Biofeedback assisted Autogenic training is effective in | ICHD Criteria specified |

ROMANIAN JOURNAL OF PHYSICAL THERAPY

| | | | | Training | indices, | Autogenic Training | Baseline, after 2 weeks and after 4 weeks of treatment | Management of Female Migraine Patients in Korean Population. | by IHS |
|----|--|--|---------|--|---|--|---|---|--|
| 6 | Deborah A stokes[15] 2010 | Single group outcome open label study | 37 | EEG Biofeedback,PIR HEG Biofeedback,Hand warming Biofeedback | Headache frequency, severity, duration and medications used | Average total of 40 sessions | 3 months to 2 years | Combined Neuro and Biofeedback interventions were effective in reducing the frequency of Migraine. | ICHD Criteria specified by IHS |
| 7 | Alvin Lake[16] 1979 | Randomized Controlled Trial | 24 | Frontalis EMG Biofeedback, Digit Temperature Biofeedback(DBT) and DBT Combined with Rational Emotive Therapy | Headache Intensity and medication Consumption for the duration of study using grid and Rating scale developed by Budzynski et al | 8 to 10 sessions of Biofeedback, 3 sessions of Rationale Emotive therapy | 3 months follow up | Digit Temperature Biofeedback alone or in Combination with RET did not prove to be more effective in the management of migraine than EMG Biofeedback Training or self Monitoring of headache activity | Positive indicators for vascular headache of the migraine type |
| 8 | Keith D Allen ,Mark D Shriver[17] 1998 | Randomized controlled Group Outcome Design | 27 | Biofeedback | Headache Frequency ,Pain Impact on Child Adaptive Functioning | Six Treatment sessions | One and three months follow up | Significant Reduction in Headache activity in Both Groups(Biofeedback and Biofeedback + Pain Behavior Management(OP)) in Children | ICHD Criteria specified by IHS |
| 9 | Peter J tuchin[18] 2000 | Randomized Controlled Study | 12 7 | Chiropractic Spinal Manipulative Therapy | Headache Frequency, Intensity(VAS),Duration,Disability,As sociated Symptoms, Use of Medications | 2 months of treatment with maximum of 16 treatments | 2 months | Statistically Significant Improvement in Migraine Frequeny, Duration, disa bility and Medication use. | ICHD Criteria specified by IHS |
| 10 | Emma Varkley [19] 2011 | Randomized Controlled Study | 91 | Exercises | Migraine frequency, pain intensity | 12 week treatment period | 3 and 6 months after | Exercise may be an option for the prophylactic treatment | ICHD Criteria |

REVISTA ROMÂNĂ DE KINETOTERAPIE

| | | | | | | | treatment | of migraine | specified by IHS |
|----|--|--|---------|---|--|---|---------------------------------|---|---|
| 11 | Kadriye alpay et al[20]2010 | Double blind Randomized cross over trial | 30 | Diet restriction based on IgG against food | No of headache days, migraine attack count, migraine attack duration, median attack severity in VAS From 0-100 | 14 weeks protocol | No Follow up | Diet restriction based on IgG antibodies might be an effective strategy in reducing the frequency of migraine attacks | ICHD Criteria specified by IHS |
| 12 | Natasha mitchel et al[21] 2011 | Single blind Randomized Controlled Study | 16 7 | Food elimination diet based on IgG antibodies | Number of Headache days, MIDAS questionnaire for Disability, Impact of Daily life by HIT 6 | 12 weeks diet program | 4 and 12 weeks follow up. | Diet elimination advise didn't reduce the disability or impact on daily life in migraine and no. of headaches at 12 weeks but it did significantly reduce no. of migraine like headaches at 4 week. | Self reported diagnosis |
| 13 | Kerstin Hedorg,Cari n Muhr[22] 2011 | Randomized Controlled trial | 83 | Multimodal Behavioral Treatment(Interne t based) | Migraine Frequency,MADR-S Depression Inventory,PQ23 Quality of Life Scale | 11 months | No Follow up | Multimodal Behavioral therapy administered over the internet appears feasible and effective in the treatment of Migraine but no effect of hand massage was found | ICHD Criteria specified by IHS |
| 14 | Jonas Bromberg et al[23] 2012 | Randomized Controlled trial | 18 5 | Web Based Intervention | Migraine disability assessment questionnaire, Chronic pain Coping Inventory 42, Headache management self efficacy scale, Pain Catastrophizing ,Patient global Impression of Change | Eight sessions(2 sessions per week)and a minimum of five sessions(one session per month)during follow up | 5 months | Experimental group reported significantly increased headache self efficacy, increased use of relaxation, increasing use of social support, decreased pain catastrophizing, decreas ed depression and decreased stress | ICHD Criteria specified by IHS |
| 15 | Kenneth A Holroyd et al [24] | Randomized Controlled trial | 23 2 | Behavioral Migraine Management(BM | Primary Outcome measure- Change in Migraines/30 days, Secondary Outcome measure-Change in Migraine | Five weeks run in period, Three | 12 months follow up | Behavioral Migraine Management with BETA Blocker | ICHD Criteria specified |

ROMANIAN JOURNAL OF PHYSICAL THERAPY

| | 2010 | | | T),BMT with Beta Blockers, Beta Blockers | days/30 days an | months(1-4) Treatment protocol | | Treatment may improve outcome in the treatment of frequent migraine | by IHS |
|----|--|--|----|---|--|--|---|--|---|
| 16 | Michael A Rapoff et al [25]2014 | Randomized controlled Clinical Trial | 35 | Cognitive behavioral Self Management Strategy | Headache frequency, Duration, severity, Migraine related disability(using Pediatric MIDAS)Quality of life | 4 weeks period | 3 months follow up | Headstrong (Cognitive Behavioral self guided CD ROM program) resulted in lower pain severity and less migraine related disability as compared to control group. | ICHD Criteria specified by IHS |
| 17 | Pamela J Dsouza et al [26]2008 | Randomized Controlled trial | 90 | Relaxation Training and written emotional Disclosure | Headache frequency, severity ,disability and general physical symptoms | 4 sessions over a two week period | Follow up after one and three months | Relaxation training improved pain severity in Migraine patients as compared to control group | ICHD Criteria specified by IHS |
| 18 | Iris L Richter et al [27]1985 | Randomized Controlled trial | 42 | Progressive deep muscle relaxation and Cognitive restructuring | Headache frequency, duration, pain Intensity, medications used | 6 weeks of treatment | 4 weeks of follow up from 12 th to 16 th week | Relaxation and Cognitive coping groups had significantly fewer headaches and less overall headache activity as compared to placebo group. | Diagnosis by Project Neurologist |
| 19 | Marina de Tomamaso et al[28] 2010 | Randomized controlled trial | 23 | High frequency transcranial magnetic stimulation | Laser Evoked Potential latency | Repetitive TMS over the hand motor cortex of the left hemishphere | No follow up | Results suggests that High frequency TMS of motor cortex and sham procedure can both modulate pain and evoked responses in Migraine patients | ICHD Criteria specified by IHS |
| 20 | Adam S Sprouce et al[29] 2013 | Randomized controlled crossover study | 55 | Neck cooling using cold packs | VAS | 2 months trial with crossover of subjects after one month. | No follow up | The application of frozen neck wrap significantly reduced recorded pain in participants with migraine headaches | ICHD Criteria specified by IHS |

VOL. 21/NR 36/Decembrie/ 2015

REVISTA ROMÂNĂ DE KINETOTERAPIE

| 21 | Younes Jahangiri Noudeh et al[30] 2012 | Pre post comparative study | 10 | Massage to trapezius, suraspin atus, posterior and lateral neck muscles and manipulation of cervical and upper thoracic spine | Verbal analog score, percent pain score reduction | One session during migraine attack | 1 Hour after manipulati on | Cervical spine massage and manipulation could significantly reduce headache pain intensity in migraine attacks | ICHD Criteria specified by IHS |
|----|---|--|----|---|--|---|---|---|---|
| 22 | Sheleigh P Lawler et al [31]2006 | Randomized controlled trial | 48 | Massage therapy | Migraine frequency, intensity, medications used, sleep behavior, heart rate, state anxiety and salivary Cortisol | Six massage sessions | 1 day and three weeks after the final massage sessions | Massage group showed significant decrease in migraine frequency and increase in sleep quality. heart rate and state anxiety decreased from pre to post massage. | ICHD Criteria specified by IHS |
| 23 | Giani Allais et al[32] 2012 | Pre post experimental Study | 40 | Acupressure | Nausea Score | Six Migraine attacks | No follow up | Nausea is significantly reduced in acupressure | ICHD Criteria specified by IHS |
| 24 | Harald j Hamre et al [33]2010 | Prospective 2 years cohort study | 45 | Anthrophosphic therapy | Average migraine severity on numeric rating scale, symptoms score and quality of life, Therapy outcome rating | 105 Days | 3,6,12,18 and 24 months after follow up | Patients with migraine under anthroposophic treatment had long term improvement of symptom and quality of life | ICHD Criteria specified by IHS |

CGI –Clinical Global Impression,HRS-Hamilton Rating Scale,DASS-Depression,Anxiety and StressScale,ICHD-International Classification of headache disorder,IHS-International Headache Disorder,MADR-S –Montgomery Asberg Depression Rating Scale,MIDAS-Migraine Disabilty Assessment Questinaire ,PGA-Patient Global Assessment,SSAI-Speiberger State Anxiety Inventory,TDCS-Transcranial Direct Current Stimulation,HIT6-Headache Impact Test,VAS-Visual Analog Score,VEP-Visual Evoked Potential

Research investigating the therapeutic effects of massage therapy for migraine headaches is very rare. Effects of massage therapy on headache frequency may be at least partially due to its impact on stress arousal.[31]

Conclusion

Based on Comprehensive literature review through PRISMA it can be concluded that non pharmacological treatment approaches like TDCS, behavioural therapies etc appear to be an effective treatment method for migraine, associated pain and migraine related symptoms.

Therefore, these approaches can be used as an adjunct therapy.

Acknowledgement. Authors are thankfull to Dr Arun Mozhi and Dr Jaspreet kaur for their help and support.

Source of funding. No source of funding is used for this systematic review.

Conflict of Interest. There is no conflict of interest.

References

- [1] Auvichayapat P, Janyachareon T, Rotenberg A, Tiamkao S, Krisanaprakronkit T, Sinawat S, Punjaruk W, Thinkhamrop B, Auvichayapat N. Migraine Prophylaxis by Anodal Transcranial Direct Current Stimulation,a Randomized ,Placebo-Controlled Trial. *J Med Assoc Thai*. 2012;95(8):1003-1012.
- [2] Gasparini CF, Sutherland HG, Griffiths LR, Studies on pathophysiology and genetic basis of Migraine. *Curr Genomics*. 2013; 14(5):300-315.
- [3] Tatji J,Pardutz A,Vamos E.,Tuka B,Kuris A,Bohar Z,Fejes A,Toldi J,Vecsei L, Migraine is a neuronal disease. *Neural Transm.* 2011; 118(4):511-524.
- [4] Raskin NH. Migraine and other headaches. Rowland LP. (2000) *Merrit's Neurology*, Philadelphiapa, Pennsylvania: Lipincott Williams and Wilkins: 807-813.
- [5] Moskowitz MA, Genes, Proteases (2007) Cortical spreading depression and migraine: impact on pathophysiology and treatment. *Funct Neurol.*; 22(3):133-136.
- [6] Eikerman KH, Moskowitz MA (2008) Animal models of migraine headache and aura. *Curr Opin. Neurol.*; 21(3): 294-300.
- [7] Lauritzen M, Dreier JP, Fabricius M, Hartings JA, Graf R,Strong AJ (2011) Clinical Relevance of Cortical spreading depression in neurological disorders: migraine, malignant stroke, subarachnoid and intracranial Hemmorrhage and traumatic brain injury, *J Cereb Blood Flow Metab.*;31(1):17-35.
- [8] Girotra P, Singh SK, Saini D, (2014) Disentanglimg the Intricacies of Migraine: A Review. *CNS Neurol Disord Drug Targets*.;13(5):776-791
- [9] Salomone S, Caraci F, Capasso A, (2009) Migraine: An Overview. *The Open Neurology Journal*.;3:64 71.
- [10] Andrasik F, Grazzi L, (2009) Behavioural Medicine for Migraine and Medication Overuse Headache. *Current pain and headache reports*.;13:241-248.
- [11] Dasilva AF, Mendonca ME, Zaghi S,Lopes M, Dossantos MF, Bajwa Z, Datta A, Bikson M, Fregni F,TDCS, (2012) Induced Analgesia and Electrical fields in pain related neural networks in neural Migraine. *Headache.*; 52(8):1283-1295.
- [12] Viganò A, D'Elia TS, Sava SL, Auvé M, De Pasqua V, Colosimo A, Di Piero V, Schoenen J, Magis D. (2013) Transcranial Direct current Stimulation of the Visual cortex; a proof of concept study based on interictal electrophysiological abnormalties in Migraine. *The Journal of headache and Pain*. 2013; Mar 11:14(1):23. doi: 10.1186/1129-2377-14-23.
- [13] Lacorix JM, Clarke MA, Bock JC, Doxey N, Wood A, Lavis S. (1983) Biofeedback and relaxation in the treatment of migraine headaches: comparative effectiveness and Physiological Corelates. *J Neurol, Neurosurg Psychiatry*.;46:525-532.
- [14] Kang E, Park J, Chung C, Yu B. (2009) Effect of biofeedback assisted autogenic trainiong on

- headache activity and mood state in Korean female migraine patients. J Korean Med Sci;24:936-940
- [15] Stokes DA, Lappin MS. (2010) Neurofeedback and Biofeedback with 37 migraineurs:a clinical outcome study. *Behavioural and Brain Function*;6:9.
- [16] Lake A, Rainey J, Papsdorf JD. (1979) Biofeedback and Rational Emotive Therapy in the management of migraine headache. *J Appl BehavAnal*;12:127-140.
- [17] Allen KD, Shriver MD. (1998) Role of Parent mediated Behavior Mangement Strategies in Biofeedback treatment of childhood Migraine. *Behavior Therapy*;29:477-490.
- [18] Tuchin PJ.A (2000) Randomized controlled trial of chiropractic spinal manipulative therapy for Migraine. *J Manipulative Physiol Ther*.;23(2):91-95.
- [19] Varkley E, Cider A, Carlson J, Linde M. Exercises as Migrane Prophylaxis: A randomized study using relaxation and topiramate as controls. *Cephalgia*;31(14):1428-1438.
- [20] Alpay K, Ertas M, Orhan EK, Ustay DK, Lieners C, Baykan B. Diet Restriction in migraine based on IgG Foods: A clinical double blind,randomized,cross over trial. *Cephalgia*; 30(7):829-837.
- [21] Mitchell N, Hewitt CE, Jayakody S, Islam M, Watt I. (2011) Randomised contolled trial of food elimination diet based on IgG Antibodies for prevention of Migraine like headaches. *Nutrition Journal*;10:85.
- [22] Hedbrog K, Muhr C. (2011) Multimodal behavioural treatment of Migraine: An internet administered, randomized controlled trial. *Ups J Med Sci.*;116:169-186.
- [23] Bromberg J, Wood ME, Black RA, Surette DA, Zacharoff KL, Chiauzzi EJ. (2012) A Randomized trial of web based intervention to improve Migraine self management and coping. *Headache*;52(2):244-261.
- [24] Holroyd KA, Cotrell CK, O'Donnel FJ, Cordingley GE, Drew JB, Carlson BW, Himawan (2010) L.Effect of preventive treatment (Beta Blocker)treatment, Behavioural migraine management, or their combination on outcomes of optimised acute treatment in frequent migraine:randomised controlled trial. *BMJ*;341:C4871.doi 10.1136/bmj.c4871.
- [25] Rapoff MA, Connelly M, Bickel JL, Powers SW, Hershey AD, Allen JR, Karlson CW, Litzenburg CC, Belmont JM. (2014) Headstrong intervention for pediatric Migraine headache:a randomized clinical trial. *The Journal of Headache and Pain*;15(1):12.
- [26] D'Souza PJ, Lumley MA, Kraft CA, Dooley JA. (2008) Relaxation Training and written Emotional disclosure for Tension or Migraine headaches: A Randomized Controlled trial. *Ann Beh Med.*; 36(1):21-32.
- [27] Richter IL, McGrath PJ, Humphreys PJ, Goodman JT, Firestone P, Keene D. (1985) Coginitive and Relaxation treatment in Paediatric Migraine. *Pain*;25:195-203.
- [28] Tommaso MD, Brighina F, Fierro B, Francesco VD, Santostasi R, Sciruicchio V, Vecchio E, Serpino C, Lambeti, Livrea P. (2010) Effects of High frequency repetitive transcranial magnetic stimulation of primary motor cortex on laser evoked potentials in Migraine. *The Journal Headache Pain*.;11:505-512.
- [29] Sprouce AS, Gabriel AK, Brown JP, Yee MH. (2013) Randomized Controlled trial: Targeted neck cooling in the treatment of the Migraine Patient. *Hawai Journal of Medicine and Public Health*; 72(7):237-241.
- [30] Noudeh YJ, Vatankhah N, Baradaran HR. (2011) Reduction of Current Migraine Headache pain following neck massage and spinal manipulation. *International Journal of therapeutic massage and bodywork*; 5(1):5-13.
- [31] Lawler SP, Cameron LD. (2006) A Randomized controlled trial of massage therapy as a treatment of Migraine. *Ann Behav Med*.;32(1):50-59.
- [32] Allias G, Rolando S, Gabellarp IC, Burzio C, Airola G, Borgogno P, Schiapparelli P, Allais R Benedetto C. (2012) Acupressure in the control of migraine associated nausea. *Neurol Sci.*; 33(1): S207-S210.
- [33] Hamre HJ, Witt CM, Kienle GS, Glockmann A, Ziegler R, Rivoir A, Willich SN, Kiene H. (2014) Anthroposophic Therapy for Migraine: A two year prospective Cohort study in routine outpatient settings. *The open Neurology Journal*; 4:100-110.

ECHILIBRUL, STATUSUL OSOS ŞI STATUSUL MUSCULAR ÎN SCLEROZA MULTIPLĂ

BALANCE, BONE AND MUSCLE STATUS IN MULTIPLE SCLEROSIS

Ianc Dorina⁸, Ilcu Flavia⁹, Tarcău Emilian¹⁰, Ciobanu Doriana¹¹, Boca Ioan Cosmin¹², Chiriac Mircea¹³

spasticity

Keywords: center of gravity, bone demineralisation, Cuvinte cheie: centrul de greutate, demineralizare osoasă, spasticitate

Abstract.

Introduction. In this study we evaluated the static and dynamic balance, walking, bone and muscular status in patients with multiple sclerosis (MS) and the results were compared with that of healthy individuals or that from unaffected segment for the muscle strength.

Methods. The study included 17 subjects with MS (37-60 years), who formed the group of MS and 20 healthy subjects (37-65 years) who formed the control group (C). The evaluation included: the bone parameters at the calcaneus; daily calcium intake; static and dynamic balance; walking; spasticity and muscle strength.

Results. The finding of balance tests indicates a high risk of falls, 47.05% of all patients tested, with having a score between 21 and Berg 40 points, which confirms that they need help for daily activities. Subjects in MS group have a low calcium intake to the recommended daily intake (604.76 mgCa/day to 1000 mgCa/day). Ultrasound parameters were low in MS subjects, indicating a higher fracture risk. The muscular assessment revealed presence of spasticity in 45.0% of subjects, only at the lower limb, triceps sural muscles, tibialis anterior and quadriceps. Muscle testing show a muscle weakness in one of the legs in all subjects.

Conclusion. The finding of this study indicate that the physiotherapy program for MS patients should having the objectives to improving balance, balancing muscle tone, slowing of bone quantity and quality loss, with introducing specific exercises for this and realizing a proper nutritional education.

Rezumat

Introducere. În acest studiu s-a evaluat echilibrul static și dinamic, mersul, statusul osos și muscular, la pacientii cu scleroză multiplă (SM). Rezultatele au fost comparate cu cele ale persoanelor sănătoase sau cu cele de la segmentul neafectat, în cazul forței musculare. etode. Au fost incluși 17 subiecți cu SM, (37-60 ani), constituind lotul SM și 20 de subiecți sănătoşi (37-65 ani), constituind lotul de control (C). S-au evaluat: parametrii osoși la nivelul calcaneului; aportul zilnic de calciu; echilibrul static și dinamic; statusul muscular (Scala Aschworth și Scala Tardieu pentru evaluarea spasticității) și forța musculară cu ajutorul dinamometrului. Rezultate. Rezultatele evaluării echilibrului și mersului indică un risc crescut la căderi, 47,05% din totalul pacienților testați, prezentând un scor Berg cuprins între 21 și 40 de puncte, ceea ce confirmă că aceștia au nevoie de ajutor în activitățile zilnice. Subiecții din lotul SM au un aport de Calciu scăzut față de aportul zilnic recomandat (604,76 mgCa/zi față de 1000 mgCa/zi). Parametrii ultrasonori au fost scăzuți la toți subiecții din lotul SM (risc mare la fractură). Spasticitatea este prezentă la 45,0% dintre subiecti, existând deficit de forță la unul din membrele inferioare la toți subiecții. Concluzii. Programul de kinetoterapie la această populație trebuie să urmărească obiectivele de îmbunătățire a echilibrului, de echilibrare a tonusului muscular, de încetinire a pierderii masei și calității osoase, introducându-se exerciții specifice pentru aceasta și realizându-li-se o educație nutrițională corectă.

Autor corespondent; tel. 0742091630; email: dianc@uoradea.ro

⁸ Conf. univ. dr., Universitatea din Oradea, Facultatea de Geografie, Turism si Sport, Departamentul de Educatie Fizică, Sport și Kinetoterapie

⁹ Student, Universitatea din Oradea, Facultatea de Geografie, Turism și Sport, Departamentul de Educație Fizică, Sport si Kinetoterapie

¹⁰ Lect. univ. dr., Universitatea din Oradea, Facultatea de Geografie, Turism și Sport, Departamentul de Educație Fizică, Sport și Kinetoterapie

¹¹ Conf. univ. dr., Universitatea din Oradea, Facultatea de Geografie, Turism și Sport, Departamentul de Educație Fizică, Sport și Kinetoterapie

¹² Conf. univ. dr., Universitatea de Vest Vasile Goldis din Arad, Facultatea de Medicină, Farmacie si Medicină dentară, Specializarea de Balneofiziokinetoterapie și Recuperare

¹³ Lect. univ. dr., Universitatea din Oradea, Facultatea de Geografie, Turism și Sport, Departamentul de Educație Fizică, Sport și Kinetoterapie

Introducere

Scleroza multiplă (SM) este o boală autoimună, inflamatorie, ce afectează sistemul nervos central, cu o etiologie necunoscută și cu tratament doar parțial eficace. SM este o afecțiune recidivantă sau progresivă și poate avea un impact negativ atât asupra stării fizice cât și psihologice.[1]

Pentru pacienți, cele mai apăsătoare probleme sunt ataxia și tulburările de echilibru, deoarece acestea cauzează probleme motorii. Pacienții observă de multe ori că pășesc larg și au probleme de echilibru când încep să meargă sau își schimbă direcția. [2]

Cercetări științifice recente au arătat că pacienții cu SM au un risc crescut de osteoporoză și fracturi din cauza combinării mai multor factori: inactivitate, nivel scăzut de vitamina D și utilizarea de medicamente de glucocorticoizi și anticonvulsii.[3]

Deşi deficitul de calciu nu este o cauză directă a SM, suplimentul de calciu, mai ales când este combinat cu vitamina D şi magneziu, ajută la diminuarea distrugerii țesutului nervos și osos asociat cu boala. Calciul lucrează împreună cu vitamina D și magneziu pentru a întări sistemul osos și pentru a preveni pierderea țesutului osos. Un studiu recent din Polonia, realizat pe 45 de pacienți de SM a arată că ionii de calciu sunt semnificativ scăzuți la bolnavii de SM comparativ cu populația sănătoasă și scad cu durata bolii.[4]

Multe persoane cu SM au spasticitate sau rigiditate musculară și spasme. De obicei afectează mușchii membrelor inferioare sau superioare și poate interfera cu abilitatea de a mobiliza liber acei mușchi. Intensitatea poate varia depinzând de poziție, postură și de starea de relaxare. [5]

Hipotonia musculară cauzează pierderea de mobilitate și afectează funcția membrelor superioare și inferioare, modifică postura și determină pacienții să folosească diverse tehnici compensatorii pentru a le permite să-și continue mersul.[6]

Studii recente au arătat prezența hipotoniei la populația suferind de SM, în special la femei cu vârsta cuprinsă între 50-59 de ani, care prezintă de asemenea tensiune arterială crescută și care iau Interferon. Un studiu pe 214 bolnavi de SM a evidențiat prezența hipotoniei la 84,08% dintre femei și 15,92% dintre bărbați.[7]

Obiectivele acestui studiu au fost evaluarea echilibrului, statusului osos și statusului muscular la pacienții suferind de scleroză multiplă, în comparație cu persoane sănătoase, de aceeași vârstă.

Material și metode

Studiul s-a realizat la Centrul de Cercetare în Performanță Motrică a Universității din Oradea și la Centrul de Scleroză Multiplă din Oradea. În studiu au fost incluși 17 subiecți diagnosticați cu scleroză multiplă (SM), cu vârsta cuprinsă între 37-60 ani, care au format lotul SM și 20 de subiecți sănătoși cu vârsta cuprinsă între 37 și 65 de ani care au format lotul de control (C). Lotul C a fost folosit doar pentru compararea rezultatelor aportului de calciu, ultrasonometriei si stabilometriei.

Estimarea gradului de dizabilitate a subiecților s-a realizat pe baza scalei extinse Kurtzke de apreciere a dizabilității (EDSS).[8] Scala este de la 0 la 10, 0 însemnând normal iar 10 = deces. Un scor de 6 indică un mers dificil, cu ajutor - cârjă, rolator - pt a merge 100 m fără pauză.

Parametrii ososi

Pentru măsurarea parametrilor osoși s-a folosit aparatul OsteoSys Sonost 3000. Acest aparat de imagerie cantitativă pe bază de ultrasunet (QUS) permite înregistrarea de imagini rapide la nivelul calcaneului.

Măsurarea s-a realizat la nivelul calcaneului piciorului neafectat sau mai puțin afectat de boală. În timpul măsurătorii, doi transductori sunt fixați coaxial de o parte și de alta a calcaneului printr-un caliper și sunt cuplați cu piele prin intermediul gelului. Semnalul primit este astfel colectat și convertit în semnal digital pentru a fi analizat.

În urma testării cu acest aparat se obțin doi parametri: SOS (speed of ultrasound – viteza ultrasunetului) și BUA (bone ultrasound attenuation – atenuarea ultrasonoră osoasă).

Un parametru BUA scăzut indică un risc de fracturare crescut, el caracterizează proprietățile osului cum ar fi rezistența, elasticitatea, densitatea și exprimă probabilitatea ca subiectul să sufere o fractură la momentul efectuării evaluării, iar parametrul SOS caracterizează densitatea osoasă și elasticitatea sa.

Cu ajutorul acestui acest aparat se poate estima BMD (Bone mineral density – densitatea minerală osoasă) exprimată în g/cm² și desemnează dacă pacientul este la un nivel scăzut, mediu ori avansat de fracturare conform criteriului WHO (World Health Organization – Organizația Mondială a Sănătății). Densitatea minerală osoasă se evaluează pe baza scorului T calculat cu ajutorul aparatului OsteoSys,în concordanță cu ghidul WHO (Report of WHO study group, 1994): osteoporoză când $T \le -2.5$, osteopenie când -2.5 < T < -1.0, normal când $T \ge -1.0$.

Scorul T furnizează rezultatul prin compararea densității osoase a pacientului cu densitatea osoasă a unei persoane ce prezintă densitate maximă osoasă (un tânăr sănătos de 30 de ani). Tehnica ultrasonoră e recunoscută ca fiind o tehnică de diagnosticare a osteoporozei.[9]

Chiar dacă tehnica ultrasonoră nu este suficientă pentru un diagnostic clinic, ea are alte avantaje, cum ar fi cost scăzut, neradiantă și ceea ce e foarte important, furnizează două tipuri de informații, despre masa osoasă și despre microstructura osului.[10]

Aportul de calciu din alimentație

Cantitatea de calciu consumată pe săptămână prin alimentația obișnuită a fost determinată cu ajutorul chestionarului frecvențial Fardellone.[11] Fiecare chestionar a fost administrat individual și completat de către subiect sub îndrumarea investigatorului. Chestionarul evaluează conținutul de calciu din dieta subiectului pe baza a 20 de tipuri de alimente și băuturi bogate în calciu iar rezultatul se obține cu ajutorul unui soft special.

Echilibrul

Pentru evaluarea echilibrului static s-a folosit testul Romberg, testul "brânciului" și stabilometria. Pentru testul Romberg, evaluatorii au cronometrat numărul de secunde și au acordat un punctaj de la 0 la 4 pentru subiecții aflați în ortostatism cu ochii închiși și picioarele lipite.

Testul "brânciului" — evaluatorii au aplicat scurte împingeri neanunțate subiecților la nivelul sternului, în spate, pe bazin, din lateral, apreciind stabilitatea și acordând un punctaj de la 0 la 4 pentru cazul în care nu este anunțat în prealabil pacientul și pentru cazul în care se cerea subiecților să se opună, să nu se lase împinși.

Stabilometria am realizat-o utilizând platforma de echilibru PEV07.[12] Platforma de echilibru permite evaluarea stabilității posturale sau a oscilațiilor posturale, măsurând forțele exercitate pe sol de corpul subiectului. Prin aceste măsurători se determină poziția centrului de presiune al persoanei (CdP) și în final stabilitatea sa.[13] Pentru fiecare subiect s-a notat aria conturului maxim a traseului realizat de CdP (A [mm2]). Acest parametru este în mod deosebit utilizat pentru a evalua influența văzului asupra stabilității posturale.[14]

Stabilometria s-a realizat la Centrul de Cercetări în Performanță Motrică a Universității din Oradea. S-au făcut două evaluări, cu ochii închiși și cu ochii deschiși.

Echilibrul dinamic a fost evaluat utilizând Scala de echilibru Berg, testul Tinetti de echilibru si testul de mers Tinetti.

Testarea a fost realizată în sala de kinetoterapie a Centrului de Scleroză Multiplă, subiecții executând 14 acțiuni diferite, iar evaluatorii acordând un punctaj de la 0 la 4, în funcție de reușita subiecților de a realiza acțiunile.

Scala de echilibru Berg înregistrează performanțele de la 0 la 4, scorul de 0 însemnând că nu poate performa de loc iar 4 însemnând performanță normală. Folosește 14 itemi cu un scor

maxim de 56 de puncte.[15] Validitatea și reliabilitatea acestui test a fost verificată la populația suferind de scleroză multiplă.[16]

Testul de echilibru Tinetti conține 7 acțiuni pentru testarea echilibrului static pe care le efectuează subiectul, iar evaluatorul acordă un scor de la 0 (incapabil) la 2 (realizare fără dificultate), după care calculează punctajul total (14 max.)

Testul de mers Tinetti conține 6 acțiuni pentru testarea echilibrului dinamic, punctajul total fiind maxim 12. Acest test este folosit atât pentru evaluarea echilibrului dinamic cât și pentru evaluarea mobilității funcționale.

Evaluarea mersului

Mersul a fost evaluat folosind testul 6 minute de mers (6MWT), testul Up and Go și testul de mers Tinetti. Testul 6 minute de mers este un test clinic standardizat de evaluare a rezistenței la mers, folosit și în alte cercetări științifice pe bolnavii cu scleroză multiplă.[17]

Pentru testul Up and Go, s-a măsurat o distanță de 3 metri, subiecții fiind cronometrați în cât timp parcurg această distanță din momentul în care s-au ridicat de pe scaun pană la reașezare.

Spasticitatea

Spasticitatea a fost evaluată la membrele inferioare, folosind Scala Aschworth și Scala Tardieu.

Scala Aschworth cuprinde grade de la 0 la 5, unde 0 reprezintă tonus normal al musculaturii, iar 5, hipertonie severă (rigiditate).

Scala Tardieu a fost aplicată subiecților suspecți de spasticitate, evaluatorul executând mișcări la diferite viteze pentru a se determina unghiul la care apare spasticitatea, calitatea reacției musculare și măsurarea amplitudinii de mișcare.

Forța musculară

Măsurarea forței musculare (în kgf) pentru mușchii membrului inferior a fost realizată cu ajutorul unui dinamometru, subiecții executând mișcări specifice fiecărui mușchi de la membrele inferioare, iar evaluatorii plasând dinamometrul în sens opus mișcărilor pentru obținerea rezultatelor.

Analiza statistică

Pentru prelucrarea datelor a fost folosit programul de statistică SPSS 16.0 for Windows. Fiind eșantionele relativ mici ca număr de subiecți, s-au folosit teste neparametrice. Pentru compararea datelor lotului SM față de lotul C, s-a folosit testul U de Mann Whitney. Pentru a compara forța musculară la membrul afectat față de membrul neafectat la grupul SM, s-a folosit testul Will-Coxon.

Rezultate

Caracteristicile subiecților din cele două loturi sunt prezentate în tabelul nr. 1. Vârsta pacienților variază între 37 și 60 de ani, valoarea medie fiind de 50,52 de ani. Vechimea bolii este cuprinsă între 9 și 26 de ani, valoarea medie fiind de 16,41 ani.

Tabel nr. 1. Caracteristicile subiecților (Media ± Abaterea standard).

| Lotul | | | Punctaj Kurtze | Vechime boală |
|--------------|--------------|----------------|----------------|---------------|
| experimental | Vârsta (ani) | $IMC (kg/m^2)$ | (EDSS) | (ani) |

| SM | $50,52 \pm 7,52$ | $25,91 \pm 4,12$ | $4,73 \pm 0,92$ | $16,41 \pm 5,07$ |
|----|------------------|------------------|-----------------|------------------|
| С | $54,2 \pm 9,33$ | $25,27 \pm 4,73$ | - | - |
| p | <0,005 | ns | - | - |

Gradul de dizabilitate

Estimarea stării de sănătate a subiecților, realizată pe baza scalei extinse Kurtzke de apreciere a dizabilității (EDSS) arată că media scorului lotului de pacienți studiat este de 4,73. Cel mai mic scor găsit este de 3,5 (dizabilitate moderată) iar cel mai mare este de 6 (dizabilitate severă). Mai multe detalii se găsesc în tabelul nr. 2.

Tabel nr. 2. Rezultatele evaluării statusului subiecților din lotul experimental conform scalei EDSS

| Scor | Descriere EDSS | Nr subiecți | % |
|------|--|----------------|-------|
| 3,5 | Dizabilitate moderată într-un SF (sistem funcțional) și mai mult decât minimă în câteva alte SF. Fără dificultăți la mers. | 2 | 11,76 |
| 4,0 | Dizabilitate relativ severă, dar capabil de a munci sau de a duce o viață relativ normală 12ore/zi. Capabil de mers fără ajutor 500m | 4 | 23,53 |
| 4,5 | Dizabilitate relativ severă, dar capabil de a munci aproape toată ziua dar cu limitări ale activităților sau asistență minimă necesară. Capabil de mers fără ajutor sau pauză 300m | 5 | 29,41 |
| 5,0 | Dizabilitate severă, suficientă pentru a afecta ADL și abilitatea de a lucra o zi întreagă. Capabil de mers fără ajutor sau pauză 200m | 1 | 5,88 |
| 6,0 | Mers dificil, cu ajutor - cârjă, rolator - pentru a merge 100 m fără pauză | 5 | 29,41 |

Echilibrul

Rezultatele testului Berg de echilibru (tabelul 3) indică afectarea acestuia, ceea ce influențează încrederea în sine a pacienților și independența lor funcțională. Media scorului Berg a lotului studiat este de 42,05 puncte (56 de puncte = un echilibru normal), valoarea maximă fiind 51 iar scorul minim 38 de puncte. Din totalul de pacienți testați, 47,05% prezintă un scor cuprins între 21 și 40 de puncte, ceea ce confirmă că aceștia au nevoie de ajutor în activitățile zilnice. Un astfel de rezultat indică de asemenea un risc crescut la căderi. [18]

Tabel nr. 3. Rezultatele evaluării echilibrului.

| | | Tinetti echilibru | Tinetti mers |
|----------|-----------|-------------------|--------------|
| Lotul SM | Scor Berg | | |
| Media | 42,71 | 10,64 | 7,47 |
| Abaterea | | | |
| standard | 4,64 | 0,93 | 1,37 |
| Minima | 38,00 | 9,00 | 6,00 |
| Maxima | 51,00 | 12,00 | 10,00 |

Rezultatele testului de echilibru Tinetti indică de asemenea probleme de echilibru la lotul SM (tabelul 3), media scorului fiind de $10,64 \pm 0,93$ puncte (valoarea minimă fiind de 9 puncte, iar maximă este de 12 puncte), față de 14 puncte cât ar indica un echilibru normal (figura nr. 1).

Punctajul mediu rezultat la testul de mers Tinetti este de 7,47±1,37 de puncte, aceasta indicând un risc crescut de cădere.

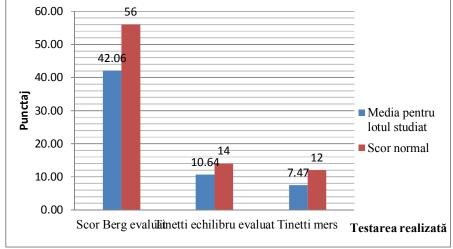


Fig. nr. 1. Comparația mediei scorului de echilibru testat față de scorul normal

Rezultatele stabilometriei au arătat că suprafața pe care s-a mișcat centrul de greutate în timpul testului cu platforma de echilibru este semnificativ mai mare la subiecții din lotul SM decât cei din lotul C, atât la proba cu ochii deschiși cât și la cea cu ochii închiși (tabelul nr. 4).

| Tabel nr. 4. Rezultatele stabilometriei. | | | | |
|---|--------------------------|-------------------------|--|--|
| | | | | |
| | A (mm²) ochi deschişi | A (mm²) ochi închişi | | |
| Lotul SM | $35,04 \pm 13,86$ | $63,81 \pm 54,39$ | | |
| Lotul C | $18,98 \pm 9,63$ | $30,37 \pm 13,33$ | | |
| P | <0,0005 | <0,0005 | | |
| $A(mm^2) = aria conturului maxim a traseului realizat de$ | | | | |
| proiecția centrului de greutate | | | | |

În tabelul 5 sunt prezentate rezultatele testului Romberg și a testului brânciului. La fel ca la celelalte teste de echilibru, și aceste teste indică dificultăți în menținerea echilibrului.

| Tabel nr. 5. Rezultatele testului Romberg și testului brânciului. | | | | | |
|---|-----------|---------|-------------------|------------------------------|--|
| | | | Testul brânciului | | |
| | | | (fără anunțarea | Testul brânciului | |
| | Romberg | Romberg | pacientului în | (cu anunțarea pacientului în | |
| Lot SM | (secunde) | (scor) | prealabil) (scor) | prealabil) (scor) | |
| Media | 21,72 | 3,14 | 2,14 | 2,57 | |
| Abaterea | | | | | |
| standard | 9,32 | 1,07 | 1,46 | 1,13 | |
| Minima | 8,00 | 1,00 | 0,00 | 1,00 | |
| Maxima | 30,00 | 4,00 | 4,00 | 4,00 | |
| | | | | | |

Rezultatele testului Time up and go și testul de 6 minute de mers (tabelul 6) arată că valorile sunt în limite normale pentru vârstnici și persoane cu dizabilități, la valoarea de 20.7 pentru testul Time up and Go fiind necesară asistența din exterior (cârjă, cadru, rolator) iar valoarea de 155 la testul de 6 minute de mers, reprezentând toleranța scăzută la efort.

Tabel nr 6. Rezultatele evaluării timpului de mers.

| | Media | Abaterea | Minima | Maxima |
|------------------|--------|----------|--------|--------|
| | | standard | | |
| Time up and go | 17.16 | 3.6 | 10.8 | 20.7 |
| (3 m) (secunde) | | | | |
| 6 minute de mers | 221,53 | 55.75 | 155 | 302 |
| (metri) | | | | |

Aportul de Calciu și starea osoasă

Rezultatele chestionarului frecvențial (tabelul 7) arată că subiecții din lotul SM au un aport de Calciu scăzut față de aportul zilnic recomandat (604,76 mgCa/zi față de 1000 mgCa/zi) și semnificativ mai mic decât subiecții din lotul C.

Toţi subiecţii din lotul SM prezintă o rezistenţă osoasă scăzută datorată atât masei osoase mici (relevate prin parametrul SOS) cât şi calităţii slabe a microarhitecturii osoase (relevate prin parametrul BUA). Mai mult, 50,0% din subiecţii testaţi prezintă susceptibilitate de osteoporoză cu un Tscore > 2,5. Parametrii ultrasonori sunt semnificativi mai mici la lotul SM faţa de lotul C.

Tabel nr. 7. Aportul de calciu și rezultatele evaluării ultrasonore osoase.

| | Aport de Calciu (mg/zi) | Tscore | SOS (m/s) | BUA (db/Mhz) |
|----------|----------------------------|------------------|---------------------|------------------|
| Lotul SM | $604,76 \pm 133,81$ | $-2,37 \pm 0,54$ | $1555,25 \pm 8,11$ | $35,75 \pm 7,95$ |
| Lotul C | $1012,45 \pm 631,54$ | $-1,61 \pm 0,91$ | $1563,99 \pm 16,66$ | $48,98 \pm 8,00$ |
| P | <0,0005 | <0,0005 | <0,005 | <0,0005 |

Starea musculară

Evaluarea spasticității a relevat prezența acesteia la 45% din subiecți, doar la membrul inferior, la mușchiul triceps sural cel mai frecvent și doar la un caz la mușchiul tibial anterior și la cvadriceps (tabelul 8).

Media scorului Aschworth a fost de 2 puncte, cel mai mic scor fiind de 1 punct și cel mai mare de 2 puncte. Evaluarea spasticității conform Scalei Tardieu a indicat același scor la toți subiecții prezentând spasticitate, scorul fiind de 2 puncte. Spasticitatea a fost sesizată pe mișcarea de flexie dorsală, la un unghi cuprins între -10° și 20°.

Tabel nr. 8. Rezultatele evaluării spasticității

| Nr. de Subiecți | Mușchiul | V2/V3 | | | Scor Aschworth |
|-----------------|-----------------|-------|-------|-------------------|----------------|
| | | X | y (°) | Mișcarea afectată | |
| 1 | Triceps sural | 2 | -5 | Flexie dorsală | 2 |
| 2 | Triceps sural | 2 | -10 | Flexie dorsală | 2 |
| 2 | Triceps sural | 2 | -15 | Flexie dorsală | 2 |
| 2 | Triceps sural | 2 | 20 | Flexie dorsală | 2 |
| 1 | Cvadriceps | 2 | 30 | Flexie genunchi | 2 |
| 1 | Tibial anterior | - | - | Flexie plantară | 1 |

În figura nr. 2 sunt prezentate valorile medii ale forței musculare (în kgf) măsurate cu dinamometrul la ambele membre inferioare. Dintre mușchii evaluați, cei mai slabi sunt flexorii șoldului, media rezultată fiind de $4,14 \pm 3,29$ kgf. Forța musculară este semnificativ mai mică la membrul inferior afectat față de membrul inferior neafectat de boală (p < 0,005).

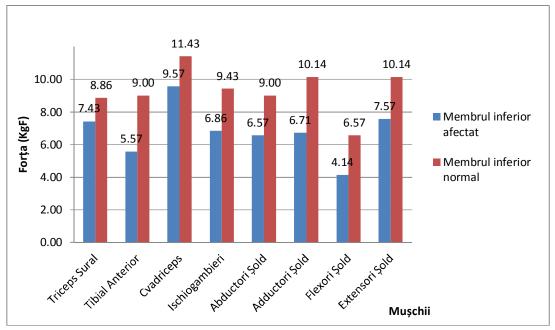


Figura nr. 2. Forța musculară la membrul inferior (valori medii ale lotului SM)

Discuții și concluzii

Obiectivul acestui studiu a fost evaluarea echilibrului, statusului osos și statusului muscular la pacienții suferind de scleroză multiplă.

Testarea echilibrului a evidențiat afectarea acestuia, ceea ce influențează încrederea în sine a pacienților și independența lor funcțională. Atât rezultatele evaluării echilibrului prin scala Berg cât și punctajul mediu total rezultat la testul de echilibru și de mers Tinetti indică un risc crescut la căderi, 47,05% din totalul de pacienți testați, prezentând un scor Berg cuprins între 21 și 40 de puncte, ceea ce confirmă că aceștia au nevoie de ajutor în activitățile zilnice. Rezultate asemănătoare au fost evidențiate și de alți autori.[19]

Evaluarea prin stabilometrie a arătat de asemenea tulburări de echilibru, aria realizată de traseul efectuat de proiecția centrului de greutate fiind semnificativ mai mare la subiecții din lotul SM decât cei din lotul C.

Conform acestor rezultate, unul din obiectivele importante urmărite prin programul de kinetoterapie trebuie să fie îmbunătățirea echilibrului.

Rezultatele chestionarului frecvențial arată că subiecții din lotul SM au un aport de Calciu scăzut față de aportul zilnic recomandat (604,76 mgCa/zi față de 1000 mgCa/zi). Un studiu recent din Polonia, realizat pe 45 de pacienți de SM a arată că ionii de calciu sunt semnificativ scăzuți la bolnavii de SM comparativ cu populația sănătoasă și scad cu durata bolii.[20]

Aceste rezultate sunt în concordanță cu rezultatele unor studii recente care au investigat relația între SM și nutriție și au arătat ca aportul de calciu este scăzut la acești pacienți față de nivelul zilnic recomandat.[21] Acest lucru poate fi explicat prin faptul că datorită conținutului ridicat de grăsimi saturate de produse lactate, pacienții cu SM sunt de obicei sfătuiți să se abțină de la consumul de aceste produse.[22] Acest lucru a fost confirmat și în studiul nostru, din discuțiile cu subiecții rezultând că aceștia nu consumă lapte și iaurt deoarece le e teamă să nu se îngrașe.

În ceea ce privește statusul osos, parametrii ultrasonori au fost scăzuți la toți subiecții, indicând o susceptabilitate de osteoporoză cu un Tscore > 2,5 și deci, un risc mare la fractură. Riscul crescut de osteoporoză și fracturi a fost evidențiat și în alte studii, acesta explicându-se prin combinarea mai multor factori: inactivitate, nivele scăzute de vitamina D și utilizarea de

medicamente de glucocorticoizi și anticonvulsii.[23] Din pacienții luați în studiul nostru, doar două persoane utilizează medicamente specifice care ar putea afecta sistemul osos.

Conform Societății canadiene de scleroză în plăci, spasticitatea este unul din simptomele cele mai frecvente în această boală și apare la aproximativ 80% dintre bolnavi.[24] În studiul nostru, evaluarea spasticității a relevat prezența acesteia la 45,0% din subiecți, doar la membrul inferior, la mușchiul triceps sural, tibial anterior și la cvadriceps.

Testarea musculară a relevat deficit de forță la unul din membrele inferioare la toți subiecții. Studii recente au arătat de asemenea prezența hipotoniei la populația suferind de SM; prezența hipotoniei a fost evidențiată în special la femei.[25]

În concluzie, programul de kinetoterapie la bolnavii cu SM trebuie să urmărească obiectivele de îmbunătățire a echilibrului, de echilibrare a tonusului muscular, în special prin tonifierea musculaturii hipotone. De asemenea, obiectivul de încetinire a pierderii masei și calității osoase nu trebuie neglijat, introducându-se exerciții specifice pentru aceasta și realizându-li-se o educatie nutritională corectă.

Referințe bibliografie

- [1] Gulick EE. (1998), Symptom and activities of daily living trajectory in multiple sclerosis: a 10-year study. *Nurs Res*; 47(3):137-146.
- [2] Derewiecki T, Duda M, Majcher P, Chmiel-Derewiecka D. (2015) Effect of physiotherapy on body balance and quality of life in women suffering from multiple sclerosis preliminary results, *Hygeia Public Health*; 50(1): 203-209
- [3] Coskun Benlidayi I, Basaran S, Evlice A, Erdem M, Demirkiran M. (2015) Prevalence and risk factors of low bone mineral density in patients with multiple sclerosis. *Acta Clin Belg.* Jun;70(3):188-92.
- [4] Kubicka-Baczyk K, Labuz-Roszak B, Pierzchala K, Adamczyk-Sowa M, and Machowska-Majchrzak A. (2015) Calcium-phosphate metabolism in patients with multiple sclerosis, *J Endocrinol Invest.*; 38(6): 635–642.
- [5] Shakespeare DT, Boggild M, Young C. (2003) Anti-spasticity agents for multiple sclerosis. *Cochrane Database Syst Rev*; 4: CD001332.
- [6] Yahia A, Ghroubi S, Mhiri C, et al. (2011) Relationship between muscular strength, gait and postural parameters in multiple sclerosis. *Ann Phys Rehabil Med*; 54: 144–155.
- [7] http://www.ehealthme.com/cs/multiple+sclerosis/hypotonia (cited 2015 October 02)
- [8] Kurtzke JF. (1983) Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology*; 33: 1444–1452.
- [9] Resch H, Pietschmann P, Bernecker P, Krexner E, Willvonseder R. (1990) Broadband ultrasound attenuation: a new diagnostic method in osteoporosis. *AJR Am J Roentgenol*; 155(4):825-828.
- [10] Hans D, Wu C, Njeh CF, Zhao S, Augat P, Newitt D, Link T, Lu Y, Majumdar S, Genant HK. (1999) Ultrasound velocity of trabecular cubes reflects mainly bone density and elasticity. *Calcif Tissue Int*., 64(1):18-23.
- [11] Fardellone P, Sebert JL, Bouraya M, Bonidan O, Leclercq G, Doutrellot C, Bellony R, Dubreuil A. (1991) Evaluation de la teneur en calcium du régime alimentaire par autoquestionnaire fréquentiel. *Rev Rhum Ed Fr*; 58:99-103
- [12] http://www.springerlink.com/content/ht14855t0120045n/ (cited 2015 October 04)
- [13] Murray M, Seireg AA and Sepic SB. (1975) Normal postural stability and steadiness: quantitative assessment *J. Bone Joint Surg.* A 57 510-16
- [14] Hasan SS, Robin DW, Zurkus DS, Ashmead DH, Peterson S W and Shiavi RG. (1996) Simultaneous measurement of body centre of pressure and centre of gravity during upright stance: Part 1: methods *Gait Posture* 4 1-10
- [15] Berg KO, Wood-Dauphinee SL, Williams JI, Gayton D. (1989) Measuring balance in the elderly: preliminary development of an instrument. *Physiother Can*: 41: 304–11.
- [16] Riddle DL, Stratford PW. (1999) Interpreting validity indexes for diagnostic tests: an illustration using the Berg balance test. *Phys Ther*; 79: 939–48.
- [17] Goldman MD, Marrie RA, Cohen JA. (2008) Evaluation of the sixminute walk in multiple sclerosis subjects and healthy controls. *Mult Scler*; 14(3):383–90.
- [18] Derewiecki T, Duda M, Majcher P, Chmiel-Derewiecka D. (2015) Effect of physiotherapy on body

- balance and quality of life in women suffering from multiple sclerosis preliminary results, *Hygeia Public Health*; 50(1): 203-209
- [19] Derewiecki T, Duda M, Majcher P, Chmiel-Derewiecka D. (2015) Effect of physiotherapy on body balance and quality of life in women suffering from multiple sclerosis preliminary results, *Hygeia Public Health*; 50(1): 203-209
- [20] Kubicka-Baczyk K, Labuz-Roszak B, Pierzchala K, Adamczyk-Sowa M, and Machowska-Majchrzak A. (2015) Calcium–phosphate metabolism in patients with multiple sclerosis, J Endocrinol Invest.; 38(6): 635–642
- [21] Schwarz S, Leweling H. (2005) Multiple sclerosis and nutrition. Mult Scler; 11(1):24-32.
- [22] Timmerman GM, Stuifbergin AK. (1999) Eating patterns in women with multiple sclerosis. *J Neurosci Nurs*; 31(3):152–8.
- [23] http://www.healthline.com/health-news/multiple-sclerosis-osteoporosis-080214#1 (cited 2015 October 02)
- [24] Société canadienne de la sclérose en plaques Division du Québec, Spasticité, troubles de la mobilité et sclérose en plaques, 2011, www.scleroseenplaques.ca/qc (cited 2015 October 02)
- [25] http://www.ehealthme.com/cs/multiple+sclerosis/hypotonia (cited 2015 October 02)

EFFECT OF ABDOMINAL DRAWING-IN MANEUVER ALONG WITH RESISTED ANKLE DORSI-FLEXION TO ACTIVATE TRANSVERSE ABDOMINIS MUSCLE IN CHRONIC NON-SPECIFIC LOW BACK PAIN

EFECTUL MANEVREI DE VACUUM ABDOMINAL ASOCIATĂ CU DORSIFLEXIA CU REZISTENȚĂ PENTRU ACTIVAREA MUȘCHIULUI TRANSVERS ABDOMINAL ÎN DUREREA NESPECIFICĂ LOMBARĂ CRONICĂ

Sharma Khushbu Dineshkumar¹⁴, Bid Dibyendunarayan², Thangamani Ramalingam A.³

Keywords: abdominal draw-in maneuver, irradiation, transverse abdominis, chronic non-specific low back pain, pressure biofeedback unit

Abstract

Introduction. Chronic non-specific low back pain (CNSLBP) is a disorder of frequently unknown etiology. Impairments in motor control (MC) have been frequently associated with CNSLBP disorder. The abdominal draw-in maneuver (ADIM) is commonly used during core stabilization techniques to restore neuromuscular control.

Scope. This study was done to investigate effectiveness of ADIM along with resisted ankle dorsiflexion (RADF) on changes in activation score of transverse abdominis (TrA) muscle using pressure biofeedback unit (PBU) in CNSLBP patients. It was a single blind randomized controlled trial.

Method: Sixty subjects with CNSLBP were randomly assigned into two groups. The subjects in Group-A (experimental group) performed ADIM along with RADF, and the subjects in Group-B (control group) performed ADIM alone. The activation score of TrA, pain and back related disability; were measured by PBU, Numeric Pain Rating scale (NPRS) and Roland-Morris disability questionnaire (RMDQ) respectively.

Result: Activation score of TrA, NPRS and RMDQ showed significant improvement in experimental group (p<0.05) than control group.

Conclusion: The result of the study suggests the use of ADIM along with RADF for effective management of CNSLBP patients to restore neuromuscular control.

Cuvinte cheie: tehnica de vacuum abdominal, iradiere, transvers abdominal, durere croică lombară nespecifică, unitate de biofeedback presor

Rezumat

Introducere. Durerea cronică lombară nespecifică (CNSLBP) este o afecțiune cu etiologie frecvent necunoscută. Tulburări ale controlului motor motor (MC) au fost associate frecvent cu CNSLBP. Manevra de vacuum abdominal (ADIM) se folosește adesea în tehnica de stabilizare a musculaturii posturale pentru retaurarea controlului neuromuscular.

Scop. Acest studiu are ca scop investigarea eficienței ADIM combinată cu dorsiflexia cu rezistență (RADF) în modificarea gradului de activare a transversului abdominal (TrA), folosind unitatea de biofeedback presor (PBU) la pacienții cu CNSLBP. Este vorba despre un studiu randomizat.

Metodă: Şaizeci de subiecți cu CNSLBP au fost împărțiți aleator în două grupuri. SUbiecții din grupul A (grupul experimental) au efectuat ADIM asociat cu RADF, iar suniceții din grupul B (grupul de control) a efectuat doar ADIM. Scorul de activare al TrA, durerea și disabilitatea lombară asociată au fost evaluate cu ajutorul PBU, Scala Numerică de evaluare a durerii (NPRS) și chestionarul Roland-Morris de evaluare a disabilității (RMDQ).

Rezultate: Scorul de activare al TrA, NPRS și RMDQ au arătat îmbunătățiri semnificative la grupul experimental (p<0.05) față de grupul de control.

Concluzii: Rezultatele studiului sugerează că folosirea ADIM asociată cu RADF sunt eficiente în managementul durerii la pacienții cu CNSLBP și pentru restabilirea controlului neuromuscular.

¹⁴ PG Student; MPT Musculoskeletal Sciences; Sarvajanik College of Physiotherapy, Rampura, Surat-395003, Guiarat. INDIA.

² Senior Lecturer; MPT (Ortho), PGDSPT; Sarvajanik College of Physiotherapy, Rampura, Surat-395003, Gujarat, INDIA

Correspondent author: dnbid71@gmail.com; Mobile: 09427139711.

³ Lecturer, ; BPT, MSc (Psy), PGDRM Sarvajanik College of Physiotherapy, Rampura, Surat-395003, Gujarat, INDIA

Introduction

Low back pain is one of the main causes of disability and despite its high prevalence the source of pain is not established in the majority of cases and the term "non-specific low back pain" is used. [1] About 90% of the patients with low back pain will receive the diagnosis 'non-specific low back pain' (NSLBP). [2] A term that signifies that no specific pathology or disease e.g., infection, tumor, osteoporosis, fracture, structural deformity etc exists. Although pain improves rapidly in the first month with a typical episode of NSLBP, low levels of pain may continue for many months. [3]

One factor that has been proposed as important in genesis and persistence of NSLBP is stability and control of spine. Studies of individuals with LBP have identified impairments in the control of deep trunk muscles [e.g., TrA and multifidus (MF)] responsible for maintaining the stability of spine. [4] These muscles could be dysfunctional in back pain patients.

The local muscles may not be able to maintain prolonged or sustained muscle contraction in order to protect continuously any unstable spinal segments, which could leave the LBP patient vulnerable to persistent strain and pain. [5] Panjabi reported evidences of lumbar instability, low muscular strength and endurance among subjects with LBP. Instability could be a result of tissue damage, making the segment more difficult to stabilize, low muscular control, and is usually a combination of all three. These three components are interdependent and one system could compensate for deficits in another. [6] Richardson et al reported that abdominal exercises were appropriate as trunk stabilization exercises that correct neutral spinal postures in response to body rotations caused by external force, since these exercises reduce the contraction of the rectus abdominis and cause the co-contraction of the external oblique, internal oblique and the transversus abdominis muscle. Methods of trunk stabilization includes, increasing the resistance and the number of the exercises including abdominal bracing, curl-ups, lateral bridges, wall squats and stabilization exercises using a ball; increasing the instability of the bearing surface using foam-rollers, balance boards, or Swissballs; and increasing the intensity of exercises. [7,8,9] Evidence on the conservative management of LBP suggests that the restoration of neuromuscular control in the TrA muscle, together with minimal contraction of other superficial internal and external abdominal oblique muscles, is essential for effective treatment during the early stages of rehabilitation. [10]

The ADIM is commonly used as core stabilization technique to restore neuromuscular control. ADIM in particular, is more effective than the use of general core stabilization techniques in improving the cross-sectional area of the TrA muscles. [11] One important mechanism by which core stabilization exercise increases the neuromuscular function of the TrA and associated lumbar spinal stability is neuromechanical stiffening of the thoracolumbar fascia (TLF). [12]. The synergistic contraction of the TrA and posterior fibers of the internal oblique (IO) increases the postero-lateral lumbar tension on the TLF that connects to the spinous and transverse processes of the lumbar spine.

The irradiation technique, which emphasizes the important contribution of the relatively stronger distal muscle group by increasing the number of potential motor-unit recruitment in muscles involved or weakened. [13,14,15] Possibly, irradiation technique may stimulate the, deep TrA muscles selectively through RADF when used in combination of with the ADIM and thus enhancing lumbar spinal stability. When ADIM is performed, the activated TrA draws the abdominal wall inward while concurrently forcing the viscera upward into the diaphragm and downward into the pelvic floor. Co-activation of the TrA and IO (TrA/IO) together with the TLF generates intra-abdominal pressure, which transforms the abdomen into a mechanically rigid cylinder, providing spinal stability. [16]

RADF is used to augment the TrA/IO via co-contraction for improving the selective activation of deep core muscles. Chon *et al* reported that co-activation of the ankle dorsiflexors and rectus femoris (RF) muscles effectively augmented the selective activation of the TrA muscle, as demonstrated by increased mean EMG amplitude of the TrA/IO muscles after the RADF. [13] Also evidence is there that core stabilization exercises can contribute to deep

abdominal contraction to improve TrA muscle activation in normal healthy individual. [13] Chon SC, You JH and Saliba SA demonstrated that a cocontraction of the ankle dorsiflexors with ADIM training might result in a thickness change in the TrA muscle and associated pain management in patients with CNSLBP. [17]

Pourpose

It was hypothesized that the selective increase in activation score of TrA muscle using PBU would be greater in the experimental group (which performed both the ADIM and RADF) compared with the control group (which performed the ADIM alone).

Matherial and Methods Participants

Table 1: Demographic data of participants (n=60), expressed as mean (standard deviation)

| | (| |
|-------------|---------------------|----------------|
| _ | Experimental (n=30) | Control (n=30) |
| Age (years) | 28.7 (6.924) | 28.7 (5.535) |
| Males | 15 | 16 |
| Females | 15 | 14 |

Over 4 months (December 2013 to March 2015) 60 male and female individuals with CNSLBP were included in the study based on the inclusion criteria: (a) Age group 18-42 years; (b) CNSLBP (>3 months); (c) Both males and females. Participants were excluded if they have: (a) lumbar injury; (b) inability to contract the abdominal muscles; (c) pressure reduction of <2 mmHg; (d) prolapsed disk, spondylolisthesis, fracture involving spine etc.

The sample size calculated was 26 subjects per group based on a power of 80% at α =0.05 to detect large differences in effect size between the groups. However, 30 subjects per group were recruited to compensate for drop-outs. There were no drop-outs in this study. Prospective random sampling was used in the study. The consent was taken from every subject and the study was approved by institutional ethical committee. Table-1 presents the demographic characteristics of the participants.

Procedure:

The baseline data were collected prior to the intervention. TrA activation measured by PBU, Pain by NPRS and disability by the RMDQ; and then participants underwent for training program for 5-days per week for 2 weeks.

Measurement of the baseline data:

ADIM Test: All participants received basic information about the function of the TrA muscle, as well as about the procedure of testing and training the TrA muscle contraction. All subjects were previously instructed to fast for 2 hours prior to testing (including water), empty the bladder immediately before the tests and not perform abdominal exercises prior to the tests.

- Starting position: Participants were positioned in a prone position on a hard surface, with the lower limbs positioned with the feet off the plinth and arms beside the trunk. The inflatable bag from the PBU was placed between the anterior superior iliac spine and the navel. Before starting the contractions, the bag was inflated to a pressure of 70 mmHg with the valve closed. To avoid muscle substitution activation patterns and ensure measurement consistency, subjects were instructed to inhale and then exhale just prior to performing the ADIM.
- Patients were requested to perform TrA muscle contractions with the following verbal commands standardized by the examiner: "Draw in your abdomen without moving the

spine or pelvis" and maintain these contractions for 10 seconds. According to the manufacturer of the PBU, the ability to contract the TrA muscle results in a pressure reduction from 4 to 10 mmHg over 10 seconds, which is recorded by PBU. [18] Activation score is amount of pressure level the subject is able to achieve.

 After the baseline scores were recorded; all subjects received standardized instructions and training on technique of performing the ADIM before the actual intervention was started.

Intervention:

Both groups performed an PBU-guided (visual feedback) ADIM for 10 repetitions per day, 5 days per week over a 2 week period, with RADF added in the experimental group. The success of ADIM was assessed by monitoring activation score of TrA. Present study was limited in the sense that irradiation was not evaluated by monitoring the recruitment sequence of activation of the tibialis anterior, rectus femoris and TrA muscles of the right lower extremity by real time EMG.

On the first day of intervention subjects were asked to adopt a crook lying position. A PBU (Stabilizer) was placed beneath their 5th lumbar vertebrae to monitor lumbar movement during the measurement of abdominal drawing-in maneuver performance. Then patient were asked to hold the dial of PBU in their hand. Subjects were instructed to use the visual feedback provided by the analog gauge of the PBU in order to maintain the determined target pressure during the abdominal draw-in and subjects were verbally cued to draw-in their abdominal wall, with the intention to move their navel toward their low back and asked to maintain 40 mmHg pressure without contracting upper abdomen and gluteal region or spine, while maintaining a neutral pelvic position in attempt to keep the target pressure range (40 to 70 mmHg). Subjects were then asked to dorsal flex their ankle joint against the resistance [with 50% maximal voluntary isometric contraction (MVIC) of the tibialis anterior] provided by a Strap band and hold this position for approximately 10 seconds and repeat it for 10 times. [13] In control group the procedure remained same excluding RADF. Subjects were again tested in prone position after 2 weeks of intervention period as described for baseline data for both the groups.



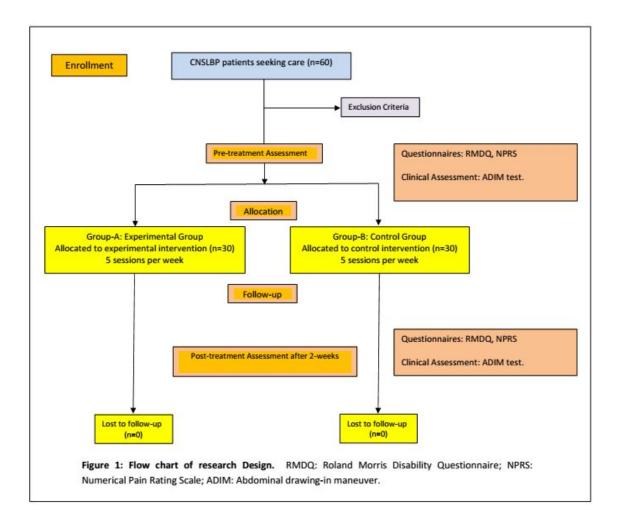
Figure-2. Baseline /after 2weeks post-treatment measurement being taken in Prone Lying position.



Figure-3. TrA training in crook lying position



Figure-4. TrA coactivation along with RADF.



Statistical analysis

Between and within group comparisons were done using Mann-Whitney U test and Wilcoxon Signed rank test (Non-parametric tests) respectively. Statistical significance was set at p<0.05 for all statistical analyses and Statistical Package for Social Sciences version 20.0 (SPSS, IBM Company, USA) was used.

Results

The present study included participants (n=60) with mean age 28.7 ± 6.24 . The table- 1 & 2 show the pre- and post- comparison; and between group comparison for the measurement variables ADIM, NPRS and RMDQ.

Table-1: Pre- and post- comparison

| Variables | Experime | ntal group | Z-value | P-value | Control | group | Z-value | P-value |
|-----------|----------|------------|---------|---------|---------|-------|---------|---------|
| | | | | | | | | |
| | Mean | SD | | | Mean | SD | | |
| ADIM Pre | 68.16 | 1.26 | | | 68.30 | 1.70 | | |
| ADIM Post | 65.93 | 1.20 | -5.062 | .000* | 68.10 | 1.80 | -2.121 | 0.34 |
| NPRS Pre | 5.73 | .907 | | | 5.53 | .90 | | |
| NPRS Post | 2.76 | 1.27 | -4.832 | .000* | 5.33 | 1.12 | -1.890 | 0.59 |
| RMDQ Pre | 6.66 | 2.13 | | | 4.70 | 1.84 | | |
| RMDQ Post | 3.00 | 2.31 | -4.812 | .000* | 4.67 | 1.76 | -1.000 | .317 |

^{*} Significant difference p<0.05

.001

.002*

| | 1.0 | ible 2. Betive | ch group con | ipai ison | | |
|-----------|--------------------|----------------|--------------|-----------|---------|---------|
| Variables | Experimental group | | Control g | group | Z-value | P-value |
| | Mean | SD | Mean | SD | | |
| ADIM Pre | 68.16 | 1.26 | 68.30 | 1.70 | 893 | .372 |
| ADIM Post | 65.93 | 1.20 | 68.10 | 1.80 | -4.592 | .000* |
| NPRS Pre | 5.73 | .907 | 5.53 | .900 | 722 | .470 |
| NPRS Post | 2.76 | 1 27 | 5 33 | 1 12 | -5 773 | 000* |

4.70

4.67

1.84

1.76

-3.418

 $-3.06\overline{1}$

Table-2: Between group comparison

6.66

3.00

2.13

2.31

RMDQ Pre

RMDO Post

Discussion

The present study showed marked improvement in activation of TrA, reduction in pain and disability score in experimental group than control group. A study conducted on chronic low back patients by O'Sullivan P *et al* also reported specific training of the deep abdominal muscles with co-contraction of lumbar multifidus showed a statistically significant reduction in pain intensity and functional disability levels. [19]

The present study used PBU which can be applied easily and is cost effective than ultrasound imagining because a study by Hides JA *et al* showed reliability of abdominal musculature measurements for recapturing the image and repetition across days ranged from low to high. [20].

The present study also supports the observations of Urquhart DM et al. (2005), which states that inward movement of the lower abdominal wall in supine produces the most independent activity of TrA relative to the other abdominal muscles, recruitment varies between regions of TrA, and observation of abdominal and lumbopelvic motion may assist in evaluation of exercise performance. [21] This study also confirms that the TrA is invariably the first muscle that is active during movement of a lower limb following contralateral weight shifting and the CNS initiates contraction of the abdominal muscles and the multifidus in a feed-forward manner in advance of the prime mover of the lower limb which is in agreement with the study done by Hodges PW and Richardson CA. [22]

Findings of the present study also suggest that the ADIM along with RADF stimulates the selective recruitment of the TrA. A study by Chul Chon S. et al on healthy population and another study by Chon SC, You JH and Saliba SA on LBP patients indicated that the combination of the ADIM and RADF was more effective in improving selective recruitment of the TrA muscle than the ADIM alone. [13,17] Moreover Wenlan Chai, So Hee Lee and Yu Hyung Park in their study also showed that abdominal muscle contraction exercises with Ankle Dorsiflexion in patients with LBP had an influence on abdominal muscle thickness and strength. [23]

However a study conducted by Gorbet Nathaniel et al (2010) between healthy and non-symptomatic LBP patients found no significant differences between activation ratios of the two groups during either exercise and TrA activation during the ADIM was higher than the quadruped exercise. [24]

Conclusion

It is observed that there is additive effect of RADF in selectively stimulating the activation of TrA muscle using PBU. This helps in reduction of pain and in reducing disability in CNSLBP population. Use of PBU enhances the activation of TrA because of visual feedback it provides to the participants.

Limitations

This study had a short follow-up period. Hence, this study should be conducted with longer follow-up period to see long term results.

Conflict of Interest: None.

^{*} Significant difference p<0.05

Authors' Contribution:

SKD performed review of literature and collection of data; BD drafted the manuscript, designed and coordinated the study; TRA performed the statistical analysis, interpretation of data and review of manuscript.

Acknowledgements

We deeply thank Dr. M. T. Rangwala (Director, Sarvajanik College of Physiotherapy, Surat), Dr. Vaibhav Shah, Dr. Preety Thakkar, Dr. Hena Patel for their support and all the participants of the study for their cooperation.

References:

- [1] Krismer, M., & van Tulder, M. (2007). Low back pain (non-specific). Best Practice & Research Clinical Rheumatology, 21 (1), 77-91.
- [2] Hannah, C., & Eva, R.-B. (2013). Clinical screening tests for assessing movement control in non-specific low-back pain. A systematic review of intra- and inter-observer reliability studies. *Manual Therapy*, 18 (2), 103-10.
- [3] Pengel, L. H., Herbert, R. D., Maher, C. G., & Refshauge, K. M. (2003). Acute low back pain: systematic review of its prognosis. *British Medical Journal*, 327 (323).
- [4] Rubinstein, S., & van, T. M. (2008). A best-evidence review of diagnostic procedures for neck and low-back pain. *Best Practice and Research. Clinical Rheumatology*, 22 (3), 471–82.
- [5] Richardson, C., Jull, G., Hodges, P. W., & Hides, J. (1998). *Therapeutic Exercise for spinal segmental stabilization in Low back pain. Scientific Basis and Clinical Approach* (1st ed.). Churchill Livingstone.
- [6] Hodges, P. (1999). Is there a role for transversus abdominis in lumbo-pelvic stability? *Manual Therapy*, 4(2), 74-86.
- [7] Akuthota, V., & Nadler, S. (2004). Core strengthening. *Archive of Physical Medicine and Rehabilitation*, 85 ((3 Suppl 1)), S86-92
- [8] Richardson, C., Toppenberg, R., & Jull, G. (1990). An initial evaluation of eight abdominal exercise for their ability to provide stabilization for the lumbar spine. *The Australian Journal of Physiotherapy*, 36 (1), 6-11.
- [9] Hall, C., & Brody, L. (2010). *Therapeutic Exercise; Moving Toward Function* (3 ed.). Philadelphia: Lippincott Williams and Wilkins.
- [10] Hodge, P., & Richarson, C. (1996). Inefficient muscular stabilization of the lumbar spine associated with low back pain. A motor control evaluation of transversus abdominis. *Spine*, 21 (22), 2640-50.
- [11] Macedo, L., Maher, C., Latimer, J., & McAuley, J. (2009). Motor Control Exercise for Persistent, Nonspecific Low back pain: A Systematic Review. *Physical Therapy*, 89 (1), 9-25.
- [12] Stanton, T., & Kawchuk, G. (2008). The effect of abdominal stabilization contractions on osteroanterior spinal stiffness. *Spine*, 33 (6), 694-701.
- [13] Chon, S., Chang, K., & You, J. (2010). Effect of the abdominal draw-in maneuver in combination with ankle dorsiflexion in strengthening the in healthy young adults: a preliminary, randomised, controlled study. *Physiotherapy*, *96* (2), 130-136.
- [14] Shimura, K., & Kasai, T. (2002). Effect of proprioceptive neuromuscular facilitation on the initiation of voluntary movement and motor evoked potentials in upper limb muscles. *Human Movement Science*, 21 (1), 101-13.
- [15] Moore, J. (1975). Excitation overflow:an electromyographic investigation. *Archive of Physical Medicine and Rehabilitation*, 56 (3), 115-20.
- [16] Nordin, M., & Frankel, V. (2001). *Basic Biomechanics of the Musculoskeletal System* (3 ed.). Philadelphia: Lippincott Williams and Wilkins.
- [17] Chon, S., You, J., & Saliba, S. (2012). Cocontraction of Ankle Dorsiflexors and Transversus Abdominis Function in Patients With Low Back Pain. *Journal of Athletic Training*, 47 (4), 379-389
- [18] von Garnier, K., Koveker, K., & Rackwitz, B. (2009). Reliability of a test measuring transversus

- abdominis muscle recruitment with pressure biofeedback unit. Physiotherapy, 95, 8-14.
- [19] O'Sullivan, P., Phyty, G., Twomey, L., & Allison, G. (1997). Evaluation of specif stabilization exercise in the treatment of chronic low back pain with radiological diagnosis of spondylolosis and spondylolysthesis. *Spine*, 22 (24), 2959-67.
- [20] Hides, J., Miokovic, T., Belavý, D., Stanton, W., & Richardson, C. (2007). Ultrasound imaging assessment of abdominal muscle function during drawing-in of the abdominal wall: an intrarater reliability study. *Journal of Orthopedic Sports Physical Therapy*, 37 (8), 480-6.
- [21] Urquhart, D., Hodges, P., Allen, T., & Story, I. (2005). Abdominal muscle recruitment during a range of voluntary exercises. *Manual Therapy*, 10 (2), 144-53.
- [22] Hodges, P., & Richardson, C. (1997). Contraction of Abdominal muscle associated with movement of lower limb. *Physical Therapy*, 77 (2), 132-142.
- [23] Chai, W., Lee, S. H., & Park, Y. H. (2014). The effect of co-contraction exercises of abdominal bracing combined with ankle dorsiflexion on abdominal muscle thickness and strength in patients with chronic low back pain. *Physical Therapy Rehabilitation Science*, 3 (2), 93-100.
- [24] Gorbet, N., Selkow, N. M., Hart, J. M., & Saliba, S. (2010). No Difference in Transverse Abdominis Activation Ratio between Healthy and Asymptomatic Low Back Pain Patients during Therapeutic Exercise. *Rehabilitation Research and Practice*, 2010 (Article ID 459738), 1-6.

PREVALENCE OF BRUXISM IN CHILDREN WITH SPASTIC CEREBRAL PALSY- A CROSS SECTIONAL STUDY

PREVALENTA BRUXISMULUI LA COPIII CU PARALIZIE CEREBRALĂ SPASTICĂ – STUDIU TRANSVERSAL

Deepa Metgud¹⁵, Pallavi Sharma¹⁶

Keywords: Spastic cerebral palsy, Bruxism, Spastic diplegic, Spastic quadriplegic, hemiplegic

Cuvinte cheie: paralizie cerebrală spastică, bruxism, diplegie spastică, patrupedie spastică, hemiplegie

Abstract

Introduction. Sleep Bruxism is a para-functional oromotor habit that can pose a threat to the Introducere. Bruxismul în somn este un obicei integrity of the masticatory system and it can have a significant effect on the patient's quality of life. Children with Cerebral Palsy are at greater risk of a wide range of oral conditions than their peers. Aim. Thus this study sought to determine the prevalence of Bruxism in children with Spastic Cerebral Palsy.

Method: This was a cross-sectional study done on 100 children with Spastic Cerebral Palsy between the age group of 3-18 years. A self designed questionnaire comprising of 49 questions like total amount of sleep, regular bed time, grinding and clenching teeth at day or night or both, pain at temporomandibular joint was explained to the parents of the subjects in their vernacular language and the results were converted in English and filled on the data collection sheets by the investigator.

Results: The results revealed the significant relationship between amount of sleep and prevalence of bruxism. Bruxism was reported in 47.06 % Spastic Diplegics, 13.04 % Spastic Hemiplegics and 35% in spastic quadriplegics.

Spastic Cerebral Palsy children.

Rezumat

oromotor parafunctional care reprezenta o amenintare pentru integritatea masticator și care poate avea un efect semnificativ asupra calității vieții pacientului. Copiii cu paralizie cerebrală prezintă un risc mare de dezvoltare a afectiunilor orale, comparative cu copiii sănătosi.

Scop. Studiul dorește să determine prevalența bruxismului la copiii cu paralizie spastică.

Metode: Acest studiu transversal a fost efectuat pe 100 de copii cu paralizie cerebrală spastică, cu vârste cuprinse între 3 – 18 ani. Un chestionar alcătuit din 49 de întrebări privind orele de somn, ora de culcare, scârțîitul și scrâșnitul dinților pe perioada zilei și nopții, durerea la nivelul articulației temporomandibulare a fost explicat părinților în limba de origine, iar răspunsurile s-au tradus în limba engleză si s-au complectat chestionarele.

Rezultate: Rezultatele au demonstrat o relație semnificativă între numărul de ore de somn și prevalența bruxismului. Bruxismul a fost raportat la 47.06% dintre copiii spastici diplegici, 13.04 % Conclusion: Prevalence of bruxism is 54% in copiii spastici hemiplegici și 35% dintre copiii cvadriplegici.

> Concluzii: Prevalența bruxismului este de 54% la copiii cu paralizie cerebrală spastică.

Introduction

Cerebral palsy is a non-progressive but often changing motor impairment syndromes that may or may not involve sensory deficits that are caused by a non-progressive defect, lesion or anomaly of the developing brain. [1] The global prevalence of cerebral palsy is approximately 2.4 per 1000 live births [2] and the incidence is higher in males than in females.[3]

¹⁵ MPT, PhD, Dept of Paediatrics P.T, KLEU institute of P.T, Belagavi, Karnataka, India

¹⁶ Post Graduate (MPT), Dept of Paediatrics P.T, KLEU institute of P.T, Belagavi, Karnataka, India Corresponding author: pallavi.pratima@gmail.com

Spastic cerebral palsy is the most common type of cerebral palsy. [4] Clinical manifestation of the cerebral palsy depends on which part of the brain is affected. [5] Cerebral palsy patient may also display the problems like epilepsy, mental retardation, sensorial deficiencies, persistent primitive reflexes, memory attention, learning and emotional problems, speaking disturbance and language. [6] Children with cerebral palsy display various dental problems similar to typically developing children. They present a higher susceptibility to oro dental diseases like periodontal disease, dental trauma, dental caries, malocclusion, temporomandibular joint disorders, enamel hypoplasia, abnormal or oral habits-tongue thrust, drooling and mouth breathing, as well as high rates of bruxism. [7]

Sleep bruxism is an oromotor activity that is characterized by the clenching or grinding of the teeth during sleep which is habitually associated with micro-arousals and is generally accompanied by sound which was defined by International classification of sleep disorders (2005). It is also defined as a diurnal or nocturnal para-functional activity that includes unconscious clenching, grinding or bracing of the teeth by American Academy of orofacial pain (2008).

The prevalence of Sleep Bruxism (SB) in children is around 14 to 20% and in young individual between the age of 18 to 29 is 13%. However prevalence in cerebral palsy is unknown.[2] Current polysomnographic and clinical studies have linked sleep related bruxism to sleep disorders. Bruxism occurs primarily during the rapid eye movement phase of sleep. It occurs once or twice per hour of sleep at a frequency of approximately 1 Hz, especially in phases 1 and 2 of non-rapid eye movement sleep.[2] SB can occur during the day or night. However, nocturnal bruxism has found to be more frequent. [10]

The etiology and characteristics of bruxism are not well understood. Many factors may be associated with bruxism like spasticity, back bone dysfunction with head projected forward, unbalanced oral myofunctional disturbances which changes the contact between the teeth and inclines hyperactivity of the main masticatory muscles (masseteric and temporal), lack of control of posture of mandible which can worsen in periods of emotional stress, use of neuroleptics, sleep disorders and malocclusion. These changes are common in children with cerebral palsy.[2] As compared to typically developing children with cerebral palsy are more susceptible to bruxism and other oral cavity disease due to poor oral hygiene, type and consistency of food, use of medications, tonicity of facial muscles. [11] Literature reports various studies on oral health in cerebral palsy, however less number of reported studies on prevalence of bruxism in cerebral palsy especially spastic cerebral palsy as less attention is paid to oral health in these children, hence the need for study.

Materials and methods

An approval for the study was obtained from Institutional Ethical Committee. It was a cross-sectional study conducted on 100 children with spastic cerebral palsy between the age group of 3-18 years. Children were taken from tertiary care unit, day care centers and special schools. Informed assent was obtained from parents before conducting the study. Cases with mixed cerebral palsy, denture, temporo-mandibular joint disorders and oral injuries were excluded.

A self-designed questionnaire on bruxism comprising of 49 questions was used to obtain information from parents. The questionnaire was in English language and included questions like total amount of sleep, regular bed time, difficulty in breathing while sleeping, snoring, day time sleepiness, periodic leg movements, grinding and clenching teeth at day or night or both and pain at temporomandibular joint. These questions were explained to the parents in their vernacular language and the answers were recorded as dichotomous. In addition information pertaining to any dental, physiotherapy and medical treatment for grinding/clenching of teeth was obtained from the parents. Pain at temporo-mandibular joint was assessed on Wong Baker Scale. [12]

Statistical analyses

Data were analyzed by the Statistical Programs. Numerical data were reported as mean and standard deviation. Chi-square test was used to assess correlation between bruxism, amount of sleep, chronological age and types of cerebral palsy. *P value* of less than 0.05 was considered significant.

Results

Chi-square test was used to assess correlation between bruxism, amount of sleep, chronological age and types of cerebral palsy. In children less than 7 years of age, the rate of bruxism was found to be 54.24% and in children more than 7 years the prevalence of bruxism was found to be 53.66%. Prevalence of bruxism varied in different types of spastic cerebral palsy, 47.06% in spastic diplegics, 13.04% in spastic hemiplegics and 81.40% in spastic quadriplegics.

The association between bruxism with amount of sleep in children showed significant correlation. It was reported that less the amount of sleep more was the rate of bruxism. There was no significant correlation between age of children and bruxism.

Table 1. Percentage of cerebral palsy children with and without bruxism

| | reage of cerebral pais | , | Wildle teller V | TUTTO GET 10 | *********** |
|-------------------|------------------------|----|-----------------|--------------|-------------|
| | | W | ith Bruxism | Witho | out Bruxism |
| Varia | bles | N | % | N | % |
| | < 7 years | 32 | 54.24 | 27 | 45.76 |
| Chronological ago | > 7 years | 22 | 53.66 | 19 | 46.34 |
| | Male | 39 | 54.17 | 33 | 45.83 |
| Gender | Female | 15 | 53.57 | 13 | 46.43 |
| | < 9 hours | 30 | 73.17 | 11 | 26.83 |
| Sleep | > 9 hours | 24 | 40.68 | 35 | 59.32 |
| T. CCD | Spastic Diplegia | 16 | 47.06 | 18 | 52.94 |
| Types of CP | Spastic Hemiplegia | 3 | 13.04 | 20 | 86.96 |
| | Spastic Quadriplegia | 35 | 81.40 | 8 | 18.60 |

| Variables | | With 1 | Bruxism | Chi-square | (σ) | p-value |
|-------------------|----------------------|--------|---------|------------|-----|----------|
| | | N | % | | | |
| | < 7 years | 32 | 54.24 | | | |
| Chronological age | > 7 years | 22 | 53.66 | 0.0033 | | 0.9545 |
| | Male | 39 | 54.17 | | | |
| Gender | Female | 15 | 53.57 | 0.0029 | | 0.9572 |
| | < 9 hours | 30 | 73.17 | | | |
| Sleep | > 9 hours | 24 | 40.68 | 10.2815 | | 0.0014* |
| | Spastic Diplegia | 16 | 47.06 | | | |
| | Spastic Hemiplegia | 3 | 13.04 | | | |
| Types of CP | Spastic Quadriplegia | 35 | 81.40 | 29.1831 | | 0.00001* |

Discussion

Bruxism has been reported to exist in many children with cerebral palsy; however, only a few studies confirm this fact but its prevalence in spastic cerebral palsy is unknown. The purpose of this study was to find the prevalence of bruxism in children with spastic cerebral palsy which was found to be around 54%. The prevalence of bruxism in the general population has been reported to be 21%. This para-functional activity could be due to factors such as spasticity, unbalanced myofunctional disturbance, backbone dysfunction with head projected forward

which changes the contact between the teeth and predisposes hyperactivity of the main masticatory muscle. The masticator muscle spasticity in cerebral palsy interferes with daily activities such as tooth brushing cleaning of oral activity and eating. ¹³ Prevalence of bruxism is 42% in Down syndrome ¹⁴ and 44% in Autism Spectrum Disorders which is comparatively less than spastic cerebral palsy. [15]

Our findings are concurred with studies that have reported a higher prevalence of oral habits in boys compared to girls in children with cerebral palsy. [16,17] Tooth eruption and shedding variation across sexes, which may be one of the reason of these reported differences or a contributing factors. When comparing the prevalence of bruxism by age subgroups, higher prevalence was found in children below 7 years (54.24%) which coincides with the study which reported that the frequency of the grinding appears to increase up to the age of seven. Most investigators agree that bruxism increases during the mixed dentition stage and decreases with age. [18]

Day time bruxism was found to be more common in Spastic cerebral palsy children.

Stress has been correlated with day time grinding. Child is hyperactive or taking medications these factors increases the risk of teeth grinding during the day. [19] Similar result was found in a study which reported that day time bruxism was more common in children with downs syndrome due to spasticity.

Children with total body involvement, Spastic Quadriplegics were significantly more affected. As they are more prone to sleep breathing disorders, difficulty in initiation and maintaining sleep that is micro arousals, fragmented sleep, increase behavioral, psychological and adaptive difficulties. as a result of increased behavioral, psychological and adaptive difficulties. [20]

Gastroesophageal reflux disease presented a higher percentage of quadriplegics individuals. It is associated with bruxism episodes, having more mandibular movements at the time of low PH on the esophagus. [21,22] Hence in the present study bruxism in quadriplegics was found to be 64.81% and that of diplegics 29.62% and hemiplegics as 5.55%.

Inverse ratio was found between the amount of sleep and bruxism in the present study that is less the amount of sleep more was the bruxism rates in children. The children with bruxism had irregularity in the bed time. The rate of bruxism in children sleeping less than 9 hours was found to be 73.17% and those children sleeping hours more than 9 hours had 40.68% of bruxism. Strong positive correlation was found between disturbance of sleep habits and psychological stress. [23] Children who sleep less will have poor quality sleep and greater cortisol response to stress. [24]

Limitations. As we were limited to small sample size and unequal size in the subgroups

Conclusion

The prevalence of bruxism in children with spastic cerebral palsy was found to be 54% of which quadriplegics were found to have the higher frequency compared to other types of cerebral palsy.

References:

- [1] J S Tecklin, *Paediatric Physical Therapy*. Lippincott Williams and Wilkins pp 179,4th ed
- [2] G. R. Oliveira C, Cancio de Paula V, Portela M, Guimar aes Primo LS, Fernanda Castro G. (2011) Bruxism Control in a Child with Cerebral Palsy. *ISRN Dentistry*;1-4
- [3] Amrita kumari, S. Yadav. (2012) Cerebral Palsy: A mini review. International journal of therapeutic
- application;3:15-24
 [4] Anca Maria Raducanu, Irina Cristea, Victor I. Feraru. (2008) Oral manifestations of Cerebral Palsy The spastic tertraparesis type: A literature review and clinical cases. *Department of pediatric*
- dentistry;58:91-97
 [5] McDonald R.E, Avery D.R. (1998) Dentistry for the child and adolescent, Dental Problems of Children with Disabilities. New York: Mosby, 7TH ed.1998;584-8.

- [6] C.H. Chu and E.C.M. Lo. (2010) Oral health status of Chinese teenagers with cerebral palsy. *Journal of community dental health*:1-5
- [7] Dr M Nallegowda et al. (2005) Oral health status in Indian children with cerebral palsy- A pilot study, *International Journal of Physical Medicine and Rehabilitation*;16(1):1-4
- [8] De la Hoz-Aizpurua JL, Díaz-Alonso E, LaTouche-Arbizu R, Mesa-Jiménez J. (2011) Sleep bruxism. Conceptual review and update. *Med Oral Patol Oral Cir Bucal*;16 (2):231-8.
- [9] G.J. Lavigne, T. Kato, A. Kolta and B.J. Sessle. (2003) Neurobiological Mechanisms Involved in Sleep Bruxism. Critical Reviews in *Oral Biology & Medicine*;14(1):30-46
- [10] A. Goncalves Antonio, V. Santos da Silva Pierro, L. Cople Maia. (2006) Bruxism in children: A warning sign for psychological problems. *J Can Dent Association*; 72(2)155-60
- [11] Renata Grzic (2011) Dental Health and Dental Care in Children with Cerebral Palsy. Coll Antropol; 35(3):761-764
- [12] Gregory Garra (2010) Validation of the Wong-Baker FACES Pain Rating Scale in Pediatric Emergency Department Patients. *Acad Emerg Med*.;17(1):50-54
- [13] Masierio D. Dos Maria Tb. (2004) Treatment of muscle spasticity in patient with cerebral palsy using BTX-A: a Pilot study. *Special Care Dentist*; 24(4):235-239
- [14] Lopez Perz R, Lopez –Morales, Borges-Yanez SA, Maupome G, Pares- Vidrio G. (2007) Prevalence of bruxism among Mexican children with down syndrome. *Down syndrome research and practice*;12(1):45-49
- [15] R De mattei, A Cuvo, S Maurizio. (2007) Oral assessment in children with an Autism Spectrum Disorder. *Journal of Dental Hygine*;81(3):1-11
- [16] Kuch EV, Till MJ, Messser LB. Bruxing and non-bruxing children: A comparision of their personality traits. Pediatric Dentistry. 1979;1(3):182-187
- [17] Shetty SR, Munshi AK. (1998) Oral habits in children- a prevalence study. Journal of indian society pedodontics preventive dentistry;16(2):61-66
- [18] Cash RG. (1998) Bruxism in children: Review of the literature. Journal of pedodontics;12:107-126
- [19] Christopher J Newman, Myra O'Regan. (2006) Sleep disorders in children with cerebral palsy. Development Medicine and child neurology;48:564-568
- [20] Fernandes Valska, Mauro Henrique Nogueira Guimaraes, Vera Lucia Silva (2015) Factors associated with bruxism in children with developmental disabilities, *Braz oral res*.;29(1)1-5
- [21] Miyawaki S, Tanimoto Y, Araki Y, Katayama A, Fujii A, Takano- Yamamoto T. (2003) Association between nocturnal bruxism and gastroesophageal reflux, *Sleep*;26:888-92.
- [22] Miyawaki S, Tanimoto Y, Araki Y, Katayama A, Imai M, Takano-Yamamoto T. (2004) Relationships among nocturnal jaw muscle activities, decreased esophageal pH, and sleep positions. *Am J Orthod Dentofacial Orthop*.;126:615-9.
- [23] Sachiko Suwa. (2009) Sleep bruxism and its relationship to sleep habits and lifestyle of elementary school children in japan. *Sleep and Biological Rhythms*;7:93-102
- [24] Capaldi VF, Handwerger K, Richardson E, Stroud LR. (2005) Associations between sleep and cortisol responses to stress in children and adolescents: a pilot study. *Behaviour Sleep Medicine*; 3:177–92

RECOMANDĂRI PENTRU AUTORI

La baza redactării lucrării stau principii deontologice, reguli, norme și uzanțe etice și estetice. Pentru realizarea aspectului uniform al revistei și pentru asigurarea ținutei științifice a articolelor, colectivul de redacție recomandă colaboratorilor revistei să ia în considerare aspectele ce se vor prezenta.

Redactarea articolelor se conformează în general recomandărilor stabilite de Comitetul Internațional al Editorilor de Reviste Medicale (www.icmje.org).

Lucrarea în extenso se va redacta în limbile română, engleză sau franceză și va fi precedată de un rezumat în limba în care este redactat articolul, precum și de un rezumat în limba română. Pentru autorii străini, lucrarea în extenso și rezumatul se vor trimite într-o limbă de circulație internațională (engleză sau franceză).

Lucrarea va avea **8-10 pagini**, inclusiv ilustrații, tabele, grafice. Se va procesa spațiat la un rând, justified, redactat în Office Word, Time New Roman, font 12, diacritice, format A4, cu margini: top 2 cm, bottom 2 cm, left/inside 2,5cm, right/outside 2cm.

PREGĂTIREA ARTICOLULUI

Titlul lucrării(în limbile română și engleză sau franceză):Din punct de vedere formal acesta trebuie să fie scurt și concis, fără paranteze, abrevieri, să nu fie explicat printr-un subtitlu, să anunțe conținutul și caracteristicile dominante ale articolului.

Titlul se scrie cu majuscule, bold, centrat, font 14.

Rezumatul lucrării(în limbile engleză sau franceză, precum și în limba română)

Acesta trebuie să informeze cititorul asupra esenței conținutului și asupra contribuției autorului; trebuie să fie fidel textului, să nu depășească 15-20 de rânduri sau 250 de cuvinte scrise cu font 11. El trebuie să fie cât mai informativ. Rezumatul va cuprinde obiectivele lucrării, metodele noi utilizate, una sau mai multe concluzii edificatoare.

Cuvinte-cheie(în limbile română și engleză sau franceză): - Vor fi precizate 3-5 cuvinte cheie, italic, aliniate stânga, cu font 11. Ele trebuie să fie semnificative, să exprime esența demersului epistemic și a conținutului articolului și să difere pe cât posibil de cuvintele din titlu.

Textul lucrării. Textul trebuie să fie echilibrat ca volum al părților componente, să aibă o exprimare clară și elevată, frazele să fie scurte, evitându-se propozițiile negative, exagerările lingvistice.

Când tema studiată necesită o clarificare teoretică sau o discuție teoretică pentru justificarea formulării ipotezei, în planul lucrării se poate afecta un capitol destinat discuțiilor datelor din literatură, încadrarea temei cercetate în contextul domeniului, aportul cercetării la clarificarea, precizarea unor aspecte, etc. Prima parte a textului cuprinde noțiuni care evidențiază importanța teoretică și practică a temei, reflectarea acesteia în literatura de specialitate, scopul lucrării, obiectivele și sarcinile acesteia, pe scurt. Dacă este necesară amintirea datelor anatomo-fizio-patologice acestea trebuie să fie scurte și noi, prin conținut și prezentare.

Se recomandă pentru studii structurarea în următoarele secțiuni:

- *Introducere* se arată pe scurt scopul și rațiunea studiului. Se prezintă numai fundalul, cu un număr limitat de referințe necesare cititorului să înțeleagă de ce a fost condus studiul.
- *Material și metodă* se prezintă ipoteza sau ipotezele alternative, se descriu pe scurt, planul și organizarea cercetării, pacienții, materialele, metodele, criteriile de includere-exludere, explorările, procedura precum și metoda statistică folosită.

Experimentele umane și non-umane: Când sunt raportate experimente umane autorii trebuie sa precizeze dacă au fost respectate standardele etice pentru experimentele umane după cum este specificat în declarația de la Helsinki, revizuite în 2000 (*World Medical Association Declaration of Helsinki: ethical principles for medicalresearch involving human subjects.* JAMA. 2000 Dec 20; 284(23):3043-5)

- *Ilustrațiile și tabelele* vor fi inserate în text la locul potrivit, numerotate cu cifre arabe (Tabel 1,2 etc., scris deasupra tabelului sau Fig.1,2.etc. scris dedesuptul figurii, caractere de 11, boltit), cu un titlu și legendă însoțite de precizarea sursei exacte a citării (titlul lucrării\articolului și primul autor). Imaginile, tabelele și figurile trebuie să fie în format jpeg, de minimum 300 dpi. Figurile (desene, scheme) vor fi reprezentate grafic profesional. Fiecare fotografie va avea menționat în subsol numărul, iar partea superioară a figurii indicată cu o săgeată (dacă nu se poate deduce care este aceasta).
- •Legendele ilustrațiilor se recomandă exprimarea rezultatelor în unități de măsură internaționale și în SI. Vor fi utilizate abrevierile acceptate internațional. Se vor scrie cu caractere Times New Roman

RECOMANDĂRI PENTRU AUTORI

- *Rezultate* trebuie expuse rezultatele detaliate și trebuie citate toate tabelele și figurile în ordinea logică și care trebuie să suplimenteze textul, nu să îl dubleze. Se subliniază numai cele mai importante observații și nu comparativ cu rezultatele altora. Aceste comparații se fac la secțiunea discuții.
- Discuții, concluzii a nu se repeta datele prezentate la rezultate și nici nu trebuie prezentate date noi aici. Prezentarea concluziilor cercetării va fi realizat sintetic și sistematic, autorul putând diviza acest capitol în funcție de caracterul teoretic sau experimental al acestora. Autorul va evidenția contribuția cercetării la progresul teoriei și practicii domeniului temei investigate. Discuțiile cuprind raportarea rezultatelor personale la datele de literatură. Vor fi subliniate aspectele noi relevate de studiu și se vor discuta implicațiile acestora și limitele lucrării. Lucrarea poate să prezinte un experiment, un studiu statistic sau să descrie o metodă sau tehnică specifică.

Analiza statistică – trebuie să fie clar specificate care teste au fost folosite pentru evaluarea datelor. Când datele sunt prezentate sub forma tabelară, testul statistic trebuie să fie indicate printr-o notă de subsol pentru fiecare test în parte.

- •Mulţumiri numai persoanelor care au adus o contribuţie semnificativă la studiu, dacă este cazul.
- Referinte bibliografice, obligatorii pentru orice articol, se vor scrie conform Convenției de la Vancouver.

Caracteristica ce diferențiază stilul de scriere a referințelor față de alte stiluri, este aceea că fiecare sursă citată va primi un număr de referință, în ordinea apriției în text. Pentru citarea în text ale aceleiași referințe se va folosi doar numărul respectiv. Biliografia va fi sortată în funcție de numărul de referință (în ordinea apariției în text) și nu în ordine alfabetică. Acest lucru va oferi cititorului posibilitatea de a găsi mai repede sursa detaliată în bibliografie. Astfel, prima sursă citată va primi numărul [1], a doua sursă citată va primi numărul doi [2] ş.a.m.d., numerele fiind scrise între paranteze drepte.

Bibliografia va cuprinde în ordine: autor, an de publicare, titlu articol, editor, numele publicației, volum, număr, pagini. În cazul citatelor, acestea se trec între ghilimele și se indică numărul sursei și pagina/paginile.

Cărți: - Sbenghe, T. (2002), Kinesiologie: Ştiința mișcării. Editura Medicală, București, pp. 112,

Reviste: - Verbunt JA, Seelen HA, Vlaeyen JW, et al. (2003)Fear of injury and physical deconditioning in patients with chronic low back pain. *Arch Phys Med Rehabil*; 84:1227-32.

Reviste on-line: - Robinson D. (2006) The correlation between mutant plague virus forms and the host animal. *SA Entomologist* [Internet].; 3: 15 [cited 2007 June 10]. Available from: http://www.saentomologist.com/175-2306/3/15

Citări de website-uri: - The South African Wild Life Trust [Internet]. [cited 2004 April 13]. Available from: www.sawlt.org/home-za.cfm

Manuscrisul/ lucrarea în format electorinc va fi trimisă la următoarea adresă:

Editor sef: CIOBANU DORIANA

Adresă de contact: doriana.ciobanu@yahoo.com

PROCESUL DE PEER-REVIEW

Manuscrisele vor fi revizuite riguros de cel puţin doi referenţi competenţi, astfel încât materialul să corespundă cu cerinţele unei reviste internaţionale. Apoi manusrcisul va fi trimise referenţilor revistei, luând în considerare tematica abordată. Redacţia va primi observaţiile referenţilor, aducând la cunăştinţa autorului modificările şi corecturile nevecare, astfel încât materialul să poată fi publicat. Procesul de recenzare durează aproximativ 4 săptămâni. Autorul va fi informat dacă articolul a fost acceptat spre publicare.

CONFLICTUL DE INTERESE

Toate posibilele conflicte de interese, precum și lipsa acestora, vor fi menționate de către autori. Dacă exisă resurse financiare, acestea vor fi menționate în lu

RECOMANDĂRI PENTRU AUTORI

CRITERII DEONTOLOGICE

Prin apariția unei lucrări în reviste, dreptul de autor se trece asupra revistei și, ca atare, lucrarea nu mai poate fi trimisă spre publicare, integral sau parțial, unei alte reviste, decât cu acordul Comitetului de redacție. De asemenea, revista nu publică lucrări apărute în alte reviste din țară sau străinătate. Răspunderea pentru conținutul științific al materialului revine în întregime autorului/ autorilor. Colectivul de redacție asigură dreptul la replică, cu argumente științifice și metodice corespunzătoare, exprimate într-un limbaj academic civilizat.

Nicio parte a lucrărilor publicate nu va putea fi folosită, vândută, copiată distribuită fără acordul prealabil, scris al autorului și numai cu respectarea Legii nr. 8/1996 privind drepturile de autor și drepturile conexe.

RECLAME

Cererile pentru spațiul de reclamă se vor adresa Colegiului Editorial al Revistei Române de Kinetoterapie.

Adresa: Str. Calea Aradului, nr 27, bl. P61, et. 5, ap.16, 410223, Oradea, Romania. mail: doriana.ciobanu@yahoo.com

Prețul unei reclame color, format A4, pentru anul 2012 va fi: 65 EURO pentru o apariție și 100 EURO pentru două apariții. Costul publicării unui logo pe copertă va depinde de spațiul ocupat.

TAXA DE ÎNSCRIERE

Revista Română de Kinetoterapie apare de două ori pe an. Accesul la ultimul număr al revistei (in extenso) și al celor precedente este gratuit pe pagina web a revistei www.revrokineto.com. Autorii pot citi, descărca, printa lucrările revistei.

Pentru cei care doresc varianta printată, prețul abonamentlui este de 45 lei/ 2 numere/ an. Expedierea este inclusa.

Pentru institutii – prețul abonamenutlui este 150 lei/ an (include câte 2exemplare/ număr și expedierea inclusa in preț)

Pentru autori, taxa de publicare este:

- 65 lei pentru cadre universitare, kinetoterapeuți sau alți specialiști ai domeniului/ număr
- 30 lei pentru studenţi nivel master/ număr

Prețul pentru fiecare număr anterior al Revistei Române de Kinetoterapie, anterior anului 2009 este de 10 lei/număr.

Pentru alte informații sau pentru înscriere on-line, se poate trimite mesaj la: doriana.ciobanu@yahoo.com

INDEXARE

Titlul revistei: Revista Română de Kinetoterapie

ISSN: 1224-6220

Pagina web: www.revrokineto.com Profil: revistă de studii, cercetări, recenzii

Editură: Editura Universității dein Oradea, recunoscută CNCSIS Indexare: Index Copernicus, Socolar, Ebsco Publishing, DOAJ, DRJI

Anul primei apariții: 1995 Periodicitate: bianual

RECOMMENDATIONS FOR THE AUTHORS

At the basis of paper editing, there are deontological principles, rules, norms and ethical and aesthetic usages. In order to achieve the uniform presentation of the journal and to ensure the scientific aspect of the papers, the Editorial staff recommends the following aspects to be taken into consideration.

The editing of manuscripts is generally made according to the recommendations established by the International Committee of Medical Journal Editors (www.icmje.org).

The full-length manuscript will be written in Romanian, English or French and it will be preceded by an abstract in the language in which the manuscript is written, as well as an abstract in the Romanian language. In the case of foreign authors, the full-length manuscript will be sent in an internationally used language (English or French).

The manuscript will have **8-10** pages, including pictures, tables and graphics. It will be written at one line, justified, edited in Word Office, Times New Roman, font 12, with diacritical signs, A4 format, with the following indents: top 2 cm, bottom 2 cm, left/inside 2.5 cm, right/outside 2 cm.

PREPARATION OF THE ARTICLE

The title of the paper (in Romanian and English or French): - From the formal point of view, it should be short and concise, without parentheses, abbreviations, it should not be explained by a subtitle, it should announce the contents and dominant characteristics of the article. The title is written in capital letters, bolded, centered, font 14.

The abstract (in English or French and in Romanian): - It should inform the reader about the essence of the contents and about the author's contribution; it has to be according to the text, it should not exceed 15-20 lines or 250 words written with font 11. It should be as informative as possible. The abstract contains the objectives of the paper, the new methods which have been used and one or more self-evident conclusions.

The keywords (in Romanian and English or French): - There will be 3-5 keywords, italic, aligned to the left, font 11. They should be significant and should express the essence of the epistemic approach and of the article contents and they should differ as much as possible from the words in the title.

The text of the paper

It should be balanced as volume of the two parts, it should have a clear and elevated language and the sentences should be short, with the avoidance of the negative sentences and linguistic exaggerations.

When the studied topic requires theoretical clarification or a theoretical discussion in order to justify the formulation of hypothesis, in the paper plan there can be a chapter for the discussions of data from literature, for the research theme to be placed in the context of the domain, the contribution of research to the clarification of certain aspects, etc. The first part of the text contains notions which emphasize the theoretical and practical importance of the theme, its reflection in the special literature, the purpose of the paper, its objectives and tasks, all on short. If it is necessary to mention anatomo-physio-pathological data, they should be short and new in content and presentation.

For studies, the following section structure is recommended:

- Introduction it is shortly shown the purpose and reason of the study. It is presented only the background, with a limited number of references necessary for the reader to understand why the study has been conducted.
- *Material and method* the hypothesis or alternative hypotheses are presented, the following are described shortly: research plan and organization, patients, materials, methods, criteria of inclusion-exclusion, explorations, used procedure as well as statistical method.

Human and non-human experiments: When human experiments are reported, the authors should state whether the ethical standards for human experiments have been respected as specified in the declaration of Helsinki, reviewed in 2000 (*World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects.* JAMA. 2000 Dec 20; 284(23):3043-5)

- The pictures and tables will be inserted in the text at the right place, numbered with Arabic numbers (Table 1, 2 etc, written above the table or Fig. 1,2 etc, written below the figure, 11, bold), with title and legend together with the exact source of the quotation (title of the paper/article and the first author). The pictures, tables and figures should be in jpeg format of minimum 300 dpi. The figures (pictures and schemes) must be professionally represented graphically. Each picture will be numbered below and pointed with an arrow above it (if it cannot be deduced which picture it is).
- *Picture legends* it is recommended the expression of results in international measurement units and in SI. There will be used internationally accepted abbreviations. The writing type will be Times New Roman letters of 10

RECOMMENDATIONS FOR THE AUTHORS

- **Results** detailed results must be presented and all tables and figures must be quoted in their logical order, which should add something more to the text, not double it. Only the most important observations are emphasized and not by comparing them with other researchers' results. These comparisons are made in the section for discussions.
- **Discussions**, **conclusions** the presented data should not be repeated at results and neither should be presented new data here. The presentation of the conclusions will be made synthetically and systematically, the author being able to divide this chapter according to the theoretical or experimental character of the conclusions. The author will emphasize the contribution of the research to the progress of theory and practice in the domain of the investigated theme. The discussions contain the reporting of personal results to data from literature. There will be emphasized the new relevant aspects of the study and their implications and the limits of the paper will be discussed.

The paper can present an experiment, a statistic study or describe a specific method or technique.

Statistic analysis – it should be specified clearly which tests have been used to evaluate data. When data are presented in the form of tables, the statistic test should be indicated in a footnote for each test.

- Aknowledgements are given only to persons who have had a significant contribution to the study, if it is the case.
- **References** is written according to the Convention from Vancouver. The characteristic which makes the difference between styles of writing references is that each quoted source will have a reference number in order of their appearance in the text, written between brackets.

In order to quote the same references in the text, there will be used only the respective number. Bibliographic reference will be written according to the number of reference (in order of appearance in the text) and not alphabetically. This will provide the possibility to find faster the detailed source in bibliography. Therefore, the first quoted source will be number [1], the second quoted source will be number [2] and so on, the numbers being written between straight parentheses [].

Each reference will contain: author, publishing year, title of the article, editor, name of publication, volume, number, pages. In the case of quotations, they are placed between quotes and it is indicated the number of the source and the page/pages.

Books: Sbenghe, T. (2002), Kinesiologie: Stiinta miscării. Editura Medicală, București, pp. 112,

Journals: Verbunt JA, Seelen HA, Vlaeyen JW, et al. (2003), Fear of injury and physical deconditioning in patients with chronic low back pain. *Arch Phys Med Rehabil*; 84:1227-32.

On-line journals:- Robinson D. (2006) The correlation between mutant plague virus forms and the host animal. *SA Entomologist* [Internet]; 3: 15 [cited 2007 June 10]. Available from: http://www.saentomologist.com/175-2306/3/15

Websites quotations: - The South African Wild Life Trust [Internet]. [cited 2004 April 13]. Available from: www.sawlt.org/ home-za. Cfm

The manuscript/ electronic format of the paperwork will be sent to the following address:

Chief Editor: CIOBANU DORIANA

Contact address: doriana.ciobanu@yahoo.com

PEER-REVIEW

The paperworks will be closely reviewed by at least two competent referees, in order to correspond to the requirements of an international journal. After that, the manuscripts will be sent to the journal's referees, taking into account the issue of the paperworks. The editorial staff will receive the observations from the referees, and will inform the author about the changes and the corrections that has to be done, in order to publish the material reviewed. The review process shoul last about 4 weeks. The author will be informed if the article was accepted for publication.

CONFLICT OF INTEREST

All possible conflicts of interest will be mentioned by the authors, as well as there is no conflict of any kind. If there is financing resources, they will be mentioned in the paperwork.

RECOMMENDATIONS FOR THE AUTHORS

DEONTOLOGICAL CRITERIA

Together with the appearance of a paper in the journal, the royalties do not belong to the author anymore but to the journal, so the paper cannot be sent for publication anymore, totally or partially, to another magazine unless the Reviewing Committee agrees to it. The journal does not publish papers appeared previously in other magazines in the country or abroad. The responsibility for the scientific contents of the material belongs entirely to the author/authors. The editing staff provides the right to reply with scientific and methodic proper arguments expressed in a civilized academic language. No part of the published papers can be used, sold, copied or distributed without the author's previous written agreement and only respecting the Law no 8/1996 regarding copyright and related rights.

ADVERTISEMENTS

Request for advertising should be addressed to the Editorial Board of the Romanian Journal of Physical Therapy

Adress: Str. Calea Aradului, nr 27, bl. P61, et. 5, ap.16, 410223, Oradea, Romania. Mail: doriana.ciobanu@yahoo.com

The price for an advert, full color A4 for the year 2012 will be: 65 EURO for one appearance and 100 EURO for two appearances. The cost for publishing one logo on the cover depends on the occupied space.

SUBSCRIPTION COSTS

The "Romanian Journal of Physical Therapy" is printed two times a year. The journal has free of charge access, on webpage **www.revrokineto.com**. Users are free to read, download, copy, distribute, print, search, or link to the full texts of journal's articles.

Only at client request, we can provide the printed version of 2 journals/ year, for an amount of 35 lei

For the authors, the publication's fee is:

- 50EURO for teachers from academic environment, physical therapists and other healt care providers/issue
- 25 EURO for master students/issue

The price for every previous issue of the Romanian Journal of Physical Therapy, before 2009, is 10 lei/ issue. Other information or for subscription, please send a message to: doriana.ciobanu@yahoo.com

INDEXING

Title of the journal: Romanian Journal of Physical Therapy

ISSN: 1224-6220

Web page: www.revrokineto.com

Profile: a journal of studies, research, reviews Editor: Oradea University Printing House

BDI Indexed: Index Copernicus, Socolar, Ebsco Publishing, DOAJ, DRJI

Year of first publication: 1995

Issue: half-early

TALON DE ABONAMENT

REVISTA ROMÂNĂ DE KINETOTERAPIE UNIVERSITATEA DIN ORADEA Str. Universității nr. 1, 410087, ORADEA pt. Facultatea de Geografie, Turism și Sport Departamentul de Educație Fizică, Sport și Kinetoterapie Felefoane: 04-0259-408148; 04-0259-408164; 0722-384835 Fax: 04-0259-425921 E-mail: doriana.ciobanu@vahoo.com

TALON DE ABONAMENT REVISTA ROMÂNĂ DE KINETOTERAPIE (2 numere/)

| NUME, PREN | UME: | ••••• | ••••• | | ••••• |
|-------------------|--------------|-------|-----------|---|-------|
| | ••••• | | | | |
| | Localitatea: | | | • | - |
| | Tel.fix: | | , | | |
| | E-mail: | | | | |

Plata se va face în contul Asociației Profesionale a Kinetoterapeuților din Transilvania, cu specificația "Abonament la Revista Română de Kinetoterapie pentru anul....." sau direct la FGTS Oradea, Departamentul de Educație Fizică, Sport și Kinetoterapie.

Banca: TRANSILVANIA

Cod IBAN: RO59BTRLRONCRT0209644501 Titular cont: ASOCIAȚIA PROFESINALĂ

A KINETOTERAPEUŢILOR DIN TRANSILVANIA

Adresa: Constantin Noica, nr.10, bl.PB8, et.1, ap.7, Oradea, Bihor, România

Vă rugăm trimiteți prin poștă sau electronic (doriana.ciobanu@yahoo.com), xerocopia dovezii de achitare a abonamentului pentru anul respectiv, iar pentru studenți și xerocopia carnetului de student, în vederea difuzării revistelor.

REVISTA ROMÂNĂ DE KINETOTERAPIE UNIVERSITATEA DIN ORADEA Str. Universității nr.1, 410087, ORADEA pt. Facultatea de Geografie, Turism și Sport Departamentul de Educație Fizică, Sport și Kinetoterapie Telefoane: 04-0259-408148; 04-0259-408164; 0722-384835 Fax: 04-0259-425921 E-mail: doriana.ciobanu@yahoo.com

TALON DE ABONAMENT REVISTA ROMÂNĂ DE KINETOTERAPIE (2 numere/)

| NUME, PRENUME: |
|---------------------------------|
| |
| Sector: Judeţ: Judeţ: |
| Cod postal: Tel.fix: Tel.mobil: |
| Fax: E-mail: |

Plata se va face în contul Asociației Profesionale a Kinetoterapeuților din Transilvania, cu specificația "Abonament la Revista Română de Kinetoterapie pentru anul....." sau direct la FGTS Oradea, Departamentul de Educație Fizică, Sport și Kinetoterapie.

Banca: TRANSILVANIA

Cod IBAN: RO59BTRLRONCRT0209644501 Titular cont: ASOCIATIA PROFESINALĂ

A KINETOTERAPEUŢILOR DIN TRANSILVANIA

Adresa: Constantin Noica, nr.10, bl.PB8, et.1, ap.7, Oradea, Bihor, România

Vă rugăm trimiteți prin poștă sau electronic (doriana.ciobanu@yahoo.com), xerocopia dovezii de achitare a abonamentului pentru anul respectiv, iar pentru studenți și xerocopia carnetului de student, în vederea difuzării revistelor.