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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 STUDY

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

Peeyoosha Nitsure[1], Neha Kothari[2]

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 eficiența.
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 pentru 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

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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 20-45years 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 ± 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/mt^2.

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.

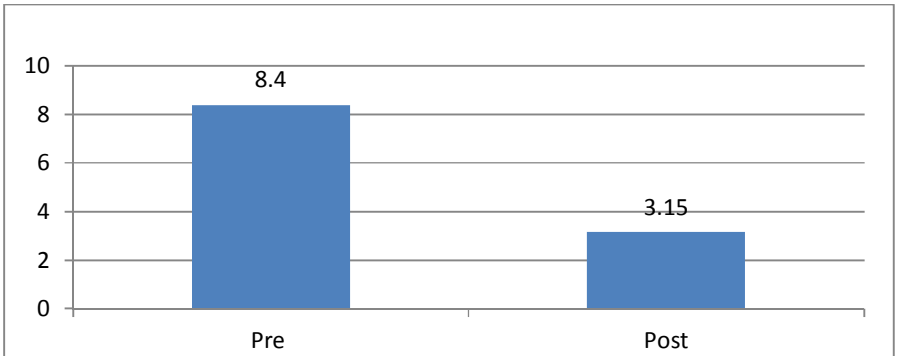
The mean neck disability index (NDI) values for pre intervention were 28.80±7.55 while post intervention mean value was 6.80±2.70. When comparison of pre and post intervention values was done the t score was 11.91 and p value was <0.0001 which can be inferred as statistically significant. (Graph 3) The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

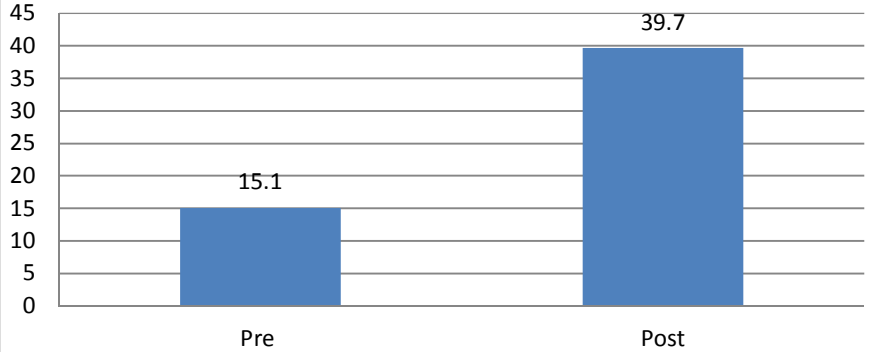
TABLE 1: Comparison of VAS, CROM and NDI

Outcome Measures	Pre-treatment	Post-treatment	Mean Difference	t Value	p Value
	Mean ± SD	Mean± SD	Mean ±SD		
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$^+$

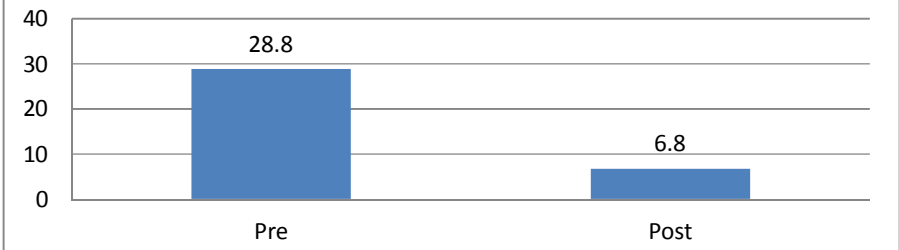
*C-ROM – Cervical Range of Motion ; +: Statisticallly Significant



GRAPH 1 -
Comparison of pre and post intervantion value of visual analogue scale



GRAPH 2 -
Comparison of pre and post intervantion value of cervical rotation range of motion



GRAPH 3 -
Comparison of pre and post intervantion value of neck disability index

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.

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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 Chitra[3], *Rishabh Sharan*[4]

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 și facilitarea 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.

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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]

Functional Independence Measure Scale: 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

MEASURES										E OF CHANGE	
		GROUP A	GROUP B	t VALUE	p VALUE	GROUP A	GROUP B	t VALUE	p VALUE	GROUP A (p VALUE)	GROUP B (p VALUE)
MAS (Motor Assessment Scale)	PRE	25.53 ± 5.6	25.53 ± 3.96	0.1129	0.9109	15.13 ± 4.94	17.87 ± 3.6	-1.7312	0.0944	59.27 % (0.00001*)	70.53 % (0.00001*)
	POST	40.67 ± 7.49	43.2 ± 3.65	-1.1777	0.2488						
BBS (Berg Balance Scale)	PRE	20.87 ± 6.19	27.8 ± 9.24	-2.4141	0.0226	8.53 ± 5.58	10.07 ± 5.23	-0.7766	0.4439	40.89 % (0.00001*)	36.21 % (0.00001*)
	POST	29.4 ± 7.58	37.87 ± 7.68	-3.0396	0.0051						
FIMS (Functional Independence Measure Scale)	PRE	80.67 ± 10.69	84.07 ± 13.4	-0.768	0.4489	21.2 ± 9.8	27.93 ± 8.14	-2.0494	0.05	26.28 % (0.00001*)	33.23 % (0.00001*)
	POST	101.87± 15.97	112 ± 7.5	-2.224	0.0344						

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.

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Conflict of interest

None

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

RECENZIE PRIVIND ABORDĂRILE TERAPEUTICE COMPORTAMENTALE ŞI PSIHICE PENTRU MANAGEMENTUL MIGRENEI

Manoj Malik[5], Shailendra Kumar Singh[6], Narkeesh Arumugam[7]

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

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

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

Rezumat

Introducere. Migrena este un sindrom comun de durere de cap cu o prevalenţă estimată de 11% în populaţia lumii. Migrena se tratează de obicei cu medicaţie, cu toate că unii pacienţi au contraindicaţii 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 Preferenţială pentru studii de recenzie şi Meta-analiză (PRISMA).

Rezultate. Rezultatele indică faptul că tratamente precum terapia comoprtamentală, biofeedback, stimulare cu curent direct transcranial, precum şi exerciţiile şi dieta restrictivă sunt eficiente în managementul migrenei şi simptomelor asociate.

Concluzie. Tehnicile nonfarmacologice pot fi o alternative sigură în managementul migrenei şi 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

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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.

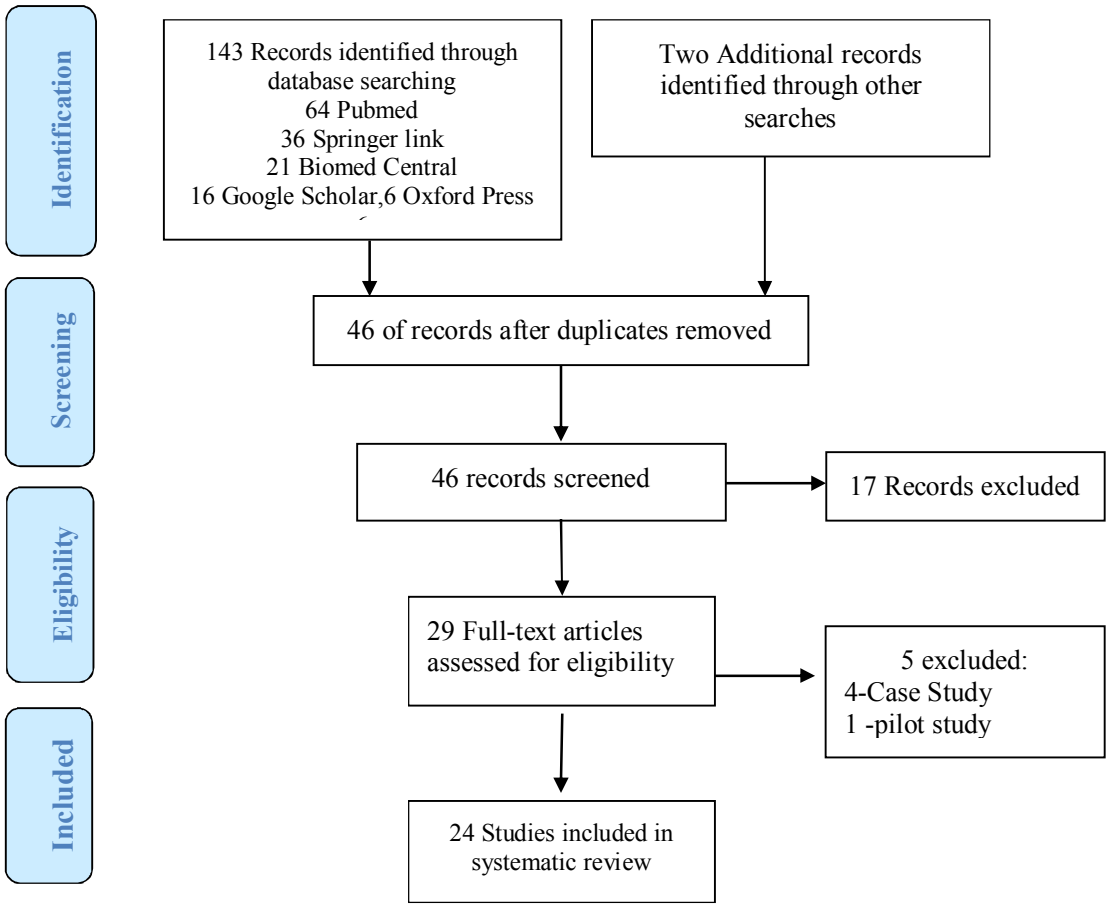

Figure 1: PRISMA Flow Diagram

Treatment interventions

TDCS was used in three studies. Biofeedback including thermal Biofeedback, Electroencephalogram (EEG) Biofeedback, 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.

S. No	Author	Design	n	Treatment applied	Outcome Measures	No. of Sessions/Study 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 Auvichayapat 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,Frontalis 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

				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

							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	167	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,Carin Muhr[22] 2011	Randomized Controlled trial	83	Multimodal Behavioral Treatment(Internet 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	185	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,decreased depression and decreased stress	ICHD Criteria specified by IHS
15	Kenneth A Holroyd et al [24]	Randomized Controlled trial	232	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

	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

21	Younes Jahangiri Noudeh et al[30] 2012	Pre post comparative study	10	Massage to trapezius,suraspinatus, 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 manipulation	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.

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ECHILIBRUL, STATUSUL OSOS ŞI STATUSUL MUSCULAR ÎN SCLEROZA MULTIPLĂ

BALANCE, BONE AND MUSCLE STATUS IN MULTIPLE SCLEROSIS

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Keywords: *center of gravity, bone demineralisation, spasticity*

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.

Cuvinte cheie: centrul de greutate, demineralizare osoasă, spasticitate

Rezumat

Introducere. În acest studiu s-a evaluat echilibrul static şi dinamic, mersul, statusul osos şi muscular, la pacienţii cu scleroză multiplă (SM). Rezultatele au fost comparate cu cele ale persoanelor sănătoase sau cu cele de la segmentul neafectat, în cazul forţei musculare. **etode.** Au fost incluşi 17 subiecţi cu SM, (37-60 ani), constituind lotul SM şi 20 de subiecţi sănătoşi (37-65 ani), constituind lotul de control (C). S-au evaluat: parametrii osoşi la nivelul calcaneului; aportul zilnic de calciu; echilibrul static şi dinamic; statusul muscular (Scala Aschworth şi Scala Tardieu pentru evaluarea spasticităţii) şi forţa musculară cu ajutorul dinamometrului. **Rezultate.** Rezultatele evaluării echilibrului şi mersului indică un risc crescut la căderi, 47,05% din totalul pacienţilor testaţi, prezentând un scor Berg cuprins între 21 şi 40 de puncte, ceea ce confirmă că aceştia au nevoie de ajutor în activităţile zilnice. Subiecţii din lotul SM au un aport de Calciu scăzut faţă de aportul zilnic recomandat (604,76 mgCa/zi faţă de 1000 mgCa/zi). Parametrii ultrasonori au fost scăzuţi la toţi subiecţii din lotul SM (risc mare la fractură). Spasticitatea este prezentă la 45,0% dintre subiecţi, existând deficit de forţă la unul din membrele inferioare la toţi subiecţii. **Concluzii.** Programul de kinetoterapie la această populaţie trebuie să urmărească obiectivele de îmbunătăţire a echilibrului, de echilibrare a tonusului muscular, de încetinire a pierderii masei şi calităţii osoase, introducându-se exerciţii specifice pentru aceasta şi realizându-li-se o educaţie nutriţională corectă.

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Introducere

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

Pentru pacienţi, cele mai apăsătoare probleme sunt ataxia şi tulburările de echilibru, deoarece acestea cauzează probleme motorii. Pacienţii observă de multe ori că păşesc larg şi au probleme de echilibru când încep să meargă sau îşi schimbă direcţia. [2]

Cercetări ştiinţifice recente au arătat că pacienţii cu SM au un risc crescut de osteoporoză şi fracturi din cauza combinării mai multor factori: inactivitate, nivel scăzut de vitamina D şi utilizarea de medicamente de glucocorticoizi şi 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 ţesutului nervos şi osos asociat cu boala. Calciul lucrează împreună cu vitamina D şi magneziu pentru a întări sistemul osos şi pentru a preveni pierderea ţesutului osos. Un studiu recent din Polonia, realizat pe 45 de pacienţi de SM a arată că ionii de calciu sunt semnificativ scăzuţi la bolnavii de SM comparativ cu populaţia sănătoasă şi scad cu durata bolii.[4]

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

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

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

Obiectivele acestui studiu au fost evaluarea echilibrului, statusului osos şi statusului muscular la pacienţii suferind de scleroză multiplă, în comparaţie cu persoane sănătoase, de aceeaşi vârstă.

Material şi metode

Studiul s-a realizat la Centrul de Cercetare în Performanţă Motrică a Universităţii din Oradea şi la Centrul de Scleroză Multiplă din Oradea. În studiu au fost incluşi 17 subiecţi diagnosticaţi cu scleroză multiplă (SM), cu vârsta cuprinsă între 37-60 ani, care au format lotul SM şi 20 de subiecţi sănătoşi cu vârsta cuprinsă între 37 şi 65 de ani care au format lotul de control (C). Lotul C a fost folosit doar pentru compararea rezultatelor aportului de calciu, ultrasonometriei şi stabilometriei.

Estimarea gradului de dizabilitate a subiecţilor s-a realizat pe baza scalei extinse Kurtzke de apreciere a dizabilităţii (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 osoşi

Pentru măsurarea parametrilor osoşi 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 puţin afectat de boală. În timpul măsurătorii, doi transductori sunt fixaţi coaxial de o parte şi de alta a calcaneului printr-un caliper şi sunt cuplaţi cu piele prin intermediul gelului. Semnalul primit este astfel colectat şi 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 proprietăţile osului cum ar fi rezistenţa, elasticitatea, densitatea şi 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/cm^2 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 $T \leq -2.5$, osteopenie când $-2.5 < T < -1.0$, normal când $T \geq -1.0$.

Scorul T furnizează rezultatul prin compararea densităţii 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 alimentaţie

Cantitatea de calciu consumată pe săptămână prin alimentaţia obişnuită a fost determinată cu ajutorul chestionarului frecvenţial Fardellone.[11] Fiecare chestionar a fost administrat individual şi completat de către subiect sub îndrumarea investigatorului. Chestionarul evaluează conţinutul de calciu din dieta subiectului pe baza a 20 de tipuri de alimente şi băuturi bogate în calciu iar rezultatul se obţine cu ajutorul unui soft special.

Echilibrul

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

Testul „brânciului” – evaluatorii au aplicat scurte împingeri neanunţate subiecţilor la nivelul sternului, în spate, pe bazin, din lateral, apreciind stabilitatea şi acordând un punctaj de la 0 la 4 pentru cazul în care nu este anunțat în prealabil pacientul şi 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 stabilităţii posturale sau a oscilaţiilor posturale, măsurând forţele exercitate pe sol de corpul subiectului. Prin aceste măsurători se determină poziţia centrului de presiune al persoanei (CdP) şi 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 influenţa văzului asupra stabilităţii posturale.[14]

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

Echilibrul dinamic a fost evaluat utilizând Scala de echilibru Berg, testul Tinetti de echilibru şi 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 performanţele 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 şi reliabilitatea acestui test a fost verificată la populaţia suferind de scleroză multiplă.[16]

Testul de echilibru Tinetti conţine 7 acţiuni 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 conţine 6 acţiuni pentru testarea echilibrului dinamic, punctajul total fiind maxim 12. Acest test este folosit atât pentru evaluarea echilibrului dinamic cât şi pentru evaluarea mobilităţii funcţionale.

Evaluarea mersului

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

Pentru testul Up and Go, s-a măsurat o distanţă de 3 metri, subiecţii fiind cronometraţi în cât timp parcurg această distanţă din momentul în care s-au ridicat de pe scaun până la reaşezare.

Spasticitatea

Spasticitatea a fost evaluată la membrele inferioare, folosind Scala Aschworth şi 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 subiecţilor suspecţi de spasticitate, evaluatorul executând mişcări la diferite viteze pentru a se determina unghiul la care apare spasticitatea, calitatea reacţiei musculare şi măsurarea amplitudinii de mişcare.

Forţa musculară

Măsurarea forţei musculare (în kgf) pentru muşchii membrului inferior a fost realizată cu ajutorul unui dinamometru, subiecţii executând mişcări specifice fiecărui muşchi de la membrele inferioare, iar evaluatorii plasând dinamometrul în sens opus mişcărilor pentru obţinerea rezultatelor.

Analiza statistică

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

Rezultate

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

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

Lotul experimental	Vârsta (ani)	IMC (kg/m²)	Punctaj Kurtze (EDSS)	Vechime boală (ani)

SM	50,52 ± 7,52	25,91 ± 4,12	4,73 ± 0,92	16,41 ± 5,07
C	54,2 ± 9,33	25,27 ± 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.

Lotul SM	Scor Berg	Tinetti echilibru	Tinetti mers
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 ± 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.

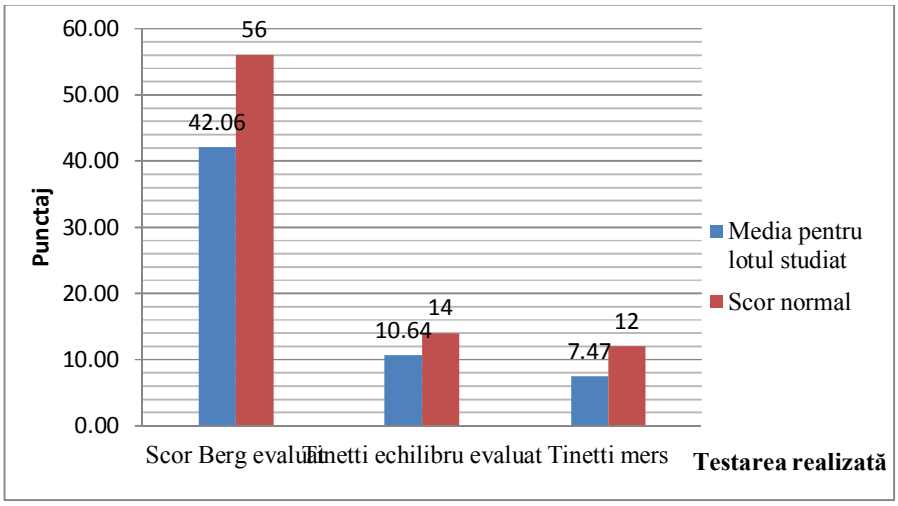

Fig. nr. 1. Comparația mediei scorului de echilibru testat față de scorul normal

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 (mm^2) ochi deschiși	A (mm^2) ochi închiși
Lotul SM	35,04 ± 13,86	63,81 ± 54,39
Lotul C	18,98 ± 9,63	30,37 ± 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.

Lot SM	Romberg (secunde)	Romberg (scor)	Testul brânciului (fără anunțarea pacientului în prealabil) (scor)	Testul brânciului (cu anunțarea pacientului în 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 standard	Minima	Maxima
Time up and go (3 m) (secunde)	17.16	3.6	10.8	20.7
6 minute de mers (metri)	221,53	55.75	155	302

Aportul de Calciu şi starea osoasă

Rezultatele chestionarului frecvenţial (tabelul 7) arată că subiecţii din lotul SM au un aport de Calciu scăzut faţă de aportul zilnic recomandat (604,76 mgCa/zi faţă de 1000 mgCa/zi) şi semnificativ mai mic decât subiecţii 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 şi rezultatele evaluării ultrasonore osoase.

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

Starea musculară

Evaluarea spasticităţii a relevat prezenţa acesteia la 45% din subiecţi, doar la membrul inferior, la muşchiul triceps sural cel mai frecvent şi doar la un caz la muşchiul tibial anterior şi la cvadriceps (tabelul 8).

Media scorului Aschworth a fost de 2 puncte, cel mai mic scor fiind de 1 punct şi cel mai mare de 2 puncte. Evaluarea spasticităţii conform Scalei Tardieu a indicat acelaşi scor la toţi subiecţii prezentând spasticitate, scorul fiind de 2 puncte. Spasticitatea a fost sesizată pe mişcarea de flexie dorsală, la un unghi cuprins între -10° şi 20°.

Tabel nr. 8. Rezultatele evaluării spasticităţii

Nr. de Subiecţi	Muşchiul	V2/V3			Scor Aschworth
		x	y (°)	Mişcarea 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 forţei musculare (în kgf) măsurate cu dinamometrul la ambele membre inferioare. Dintre muşchii evaluaţi, cei mai slabi sunt flexorii şoldului, media rezultată fiind de 4,14 ± 3,29 kgf. Forţa musculară este semnificativ mai mică la membrul inferior afectat faţă de membrul inferior neafectat de boală (p < 0,005).

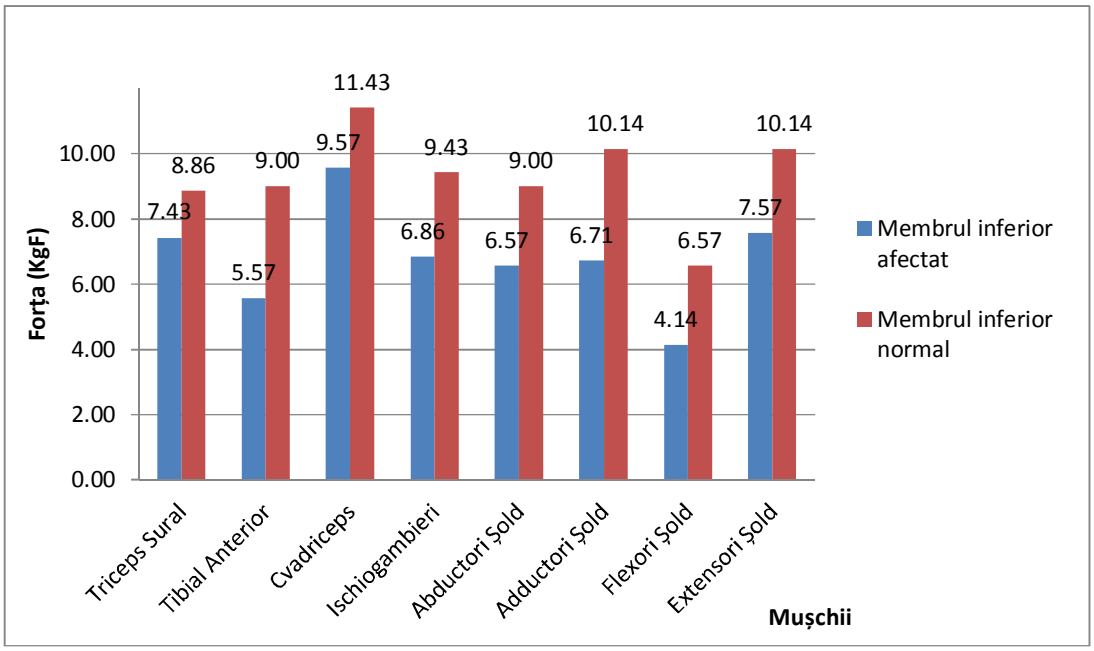

Figura nr. 2. Forța musculară la membrul inferior (valori medii ale lotului SM)

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 şi anticonvulsii.[23] Din pacienţii luaţi în studiul nostru, doar două persoane utilizează medicamente specifice care ar putea afecta sistemul osos.

Conform Societăţii canadiene de scleroză în plăci, spasticitatea este unul din simptomele cele mai frecvente în această boală şi apare la aproximativ 80% dintre bolnavi.[24] În studiul nostru, evaluarea spasticităţii a relevat prezenţa acesteia la 45,0% din subiecţi, doar la membrul inferior, la muşchiul triceps sural, tibial anterior şi la cvadriceps.

Testarea musculară a relevat deficit de forţă la unul din membrele inferioare la toţi subiecţii. Studii recente au arătat de asemenea prezenţa hipotoniei la populaţia suferind de SM; prezenţa hipotoniei a fost evidenţiată în special la femei.[25]

În concluzie, programul de kinetoterapie la bolnavii cu SM trebuie să urmărească obiectivele de îmbunătăţire a echilibrului, de echilibrare a tonusului muscular, în special prin tonifierea musculaturii hipotone. De asemenea, obiectivul de încetinire a pierderii masei şi calităţii osoase nu trebuie neglijat, introducându-se exerciţii specifice pentru aceasta şi realizându-li-se o educaţie nutriţională corectă.

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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

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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: Șaizeci 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.

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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 Swiss-balls; 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 2-weeks post-treatment measurement being taken in Prone Lying position.

Figure-3. TrA training in crook lying position

Figure-4. TrA co-activation along with RADF.

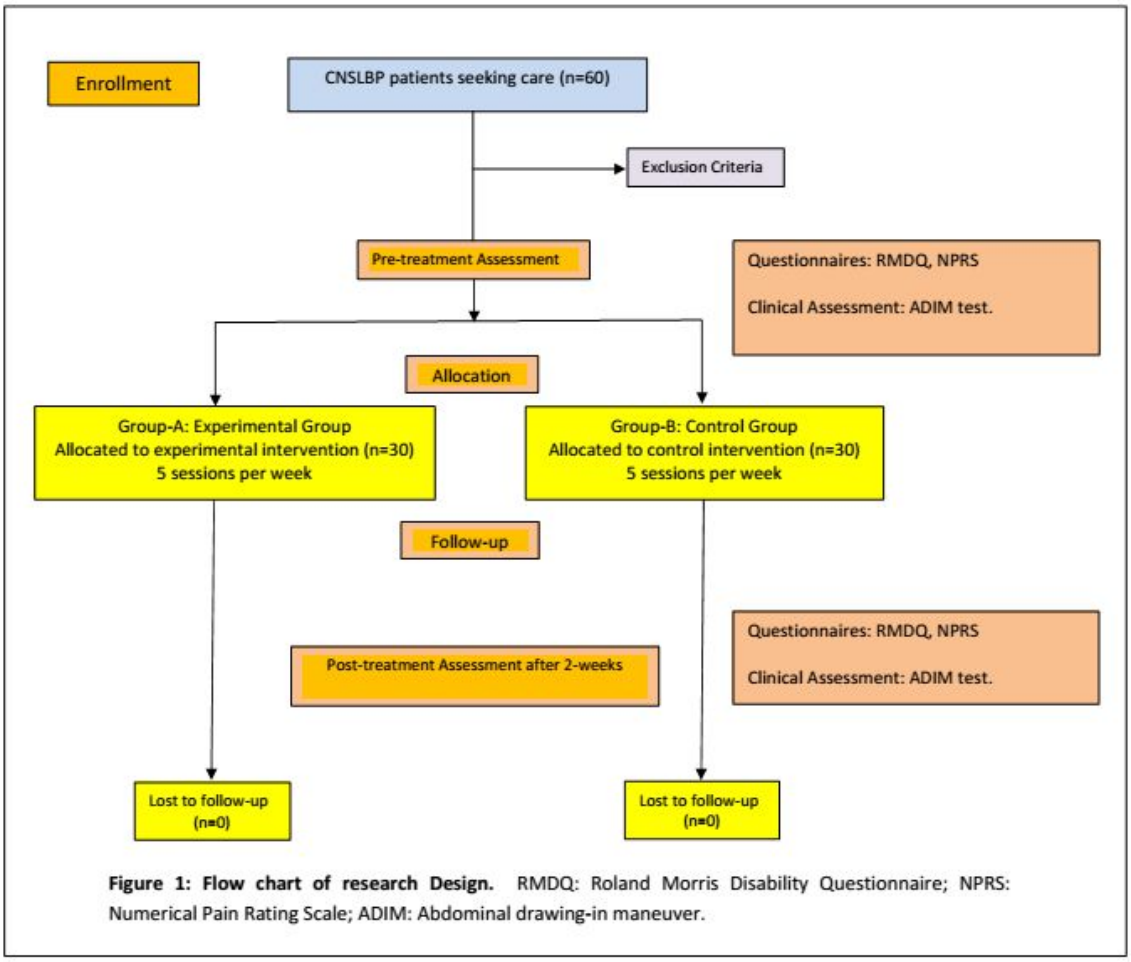

Figure 1: Flow chart of research Design. RMDQ: Roland Morris Disability Questionnaire; NPRS: Numerical Pain Rating Scale; ADIM: Abdominal drawing-in maneuver.

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	Experimental 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 $p<0.05$

Table-2: Between group comparison

Variables	Experimental group		Control 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*
RMDQ Pre	6.66	2.13	4.70	1.84	-3.418	.001
RMDQ Post	3.00	2.31	4.67	1.76	-3.061	.002*

* Significant difference $p<0.05$

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.

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.

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

PREVALENȚA BRUXISMULUI LA COPIII CU PARALIZIE CEREBRALĂ SPASTICĂ – STUDIU TRANSVERSAL

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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 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.
Conclusion: Prevalence of bruxism is 54% in Spastic Cerebral Palsy children.

Rezumat

Introducere. Bruxismul în somn este un obicei oromotor parafuncțional care reprezenta o amenințare pentru integritatea sistemului masticator şi care poate avea un efect semnificativ asupra calității vieții pacientului. Copiii cu paralizie cerebrală prezintă un risc mare de dezvoltare a afecțiunilor orale, comparative cu copiii sănătoşi.
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 şi scrâşnitul dinților pe perioada zilei şi nopții, durerea la nivelul articulației temporomandibulare a fost explicat părinților în limba de origine, iar răspunsurile s-au tradus în limba engleză şi s-au complectat chestionarele.
Rezultate: Rezultatele au demonstrat o relație semnificativă între numărul de ore de somn şi prevalența bruxismului. Bruxismul a fost raportat la 47.06% dintre copiii spastici diplegici, 13.04 % copiii spastici hemiplegici şi 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]

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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%.[8] 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

Variables		With Bruxism		Without Bruxism	
		N	%	N	%
Chronological age	< 7 years	32	54.24	27	45.76
	> 7 years	22	53.66	19	46.34
Gender	Male	39	54.17	33	45.83
	Female	15	53.57	13	46.43
Sleep	< 9 hours	30	73.17	11	26.83
	> 9 hours	24	40.68	35	59.32
Types of CP	Spastic Diplegia	16	47.06	18	52.94
	Spastic Hemiplegia	3	13.04	20	86.96
	Spastic Quadriplegia	35	81.40	8	18.60

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

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.

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

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