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CUPRINS / CONTENT

EFFICACY OF MUSIC THERAPY IN IMPROVEMENT OF NEUROMOTOR DEVELOPMENT IN PRETERM INFANTS

EFICIENȚA TERAPIEI PRIN MUZICĂ ÎN ÎMBUNĂTĂȚIREA DEZVOLTĂRII NEUROMOTORII, LA SUGARII PREMATURI

Priyanka K. Nakhwa[1], Mandar Malawade[2], D. Y Shrikhande[3], Sheila Shrikhande[4], Pallavi Rokade[5]

Keywords: preterm, music therapy, developmental program

Cuvinte cheie: prematuri, meloterapie, program de dezvoltare

Abstract:

Background. Preterm birth is associated with an increased prevalence of major and minor neurodevelopmental disability. Infants born before 37 weeks of gestational age are considered preterm infants, and very preterm infants are those who are born before 32 weeks' gestational age. Infants born preterm may have a lower threshold for sensory input than full term born peers and have difficulty in tolerating handling and interaction. These problems could diminish critical experiences in their early lives.

Objectives. To determine the effect of Music Therapy and Developmental Program on Preterm infants in Neonatal Intensive Care Unit.

Methods. Forty participants were found eligible for the study as per inclusion and exclusion criteria and they were selected by simple random sampling. They were divided into two groups. Group A was a controlled group and Group B was an experimental group. There were 2 drop outs in each group because of early discharge, thus each group had 18 participants. All infants motor performance was assessed on the first and last day of intervention using TIMPS and INFANIB. Intervention was given for 3 weeks and for 30 minutes 3 times per week. Group A was given developmental program and Group B was given developmental program and music therapy.

Results. Statistical analysis was done using GraphPad InStat 3.06. Statistical significance was set at $p < 0.05$. The data analysis shows that there was marked difference in the score of INFANIB and TIMPS score which shows that music therapy and developmental program is effective in the 18 participants of the study.

Discussions. There was marked improvement in the activity and alertness of the infant. There were changes in French angle components of INFANIB including heel to hear and popliteal angle.

Conclusion. Music therapy can be used to improve the neuromotor development of the preterm infants. Thus, these strategies can be applied on a regular basis for helping such preterm infants to improve their alertness and to improve their neuromotor development.

Rezumat:

Introducere. Naşterea prematură este asociată cu o prevalenţă crescută a handicapului major şi minor în neurodezvoltare. Sugarii născuţi înainte de 37 de săptămâni de sarcină, sunt consideraţi sugari prematuri, şi foarte prematuri copiii sunt cei care sunt născuţi înainte de 32 de săptămâni, cu vârsta gestaţională. Sugarii născuţi prematur pot avea un prag senzorial mai redus decât copiii născuţi la termen şi au dificultăţi în tolerarea la manipulare şi interacţiune. Aceste probleme ar putea diminua experienţele critice în viaţa lor timpurie.

Obiective. Determinarea efectului terapiei prin muzică şi a programului de dezvoltare la nou-născuţii prematur, în unitatea de terapie intensiva de neonatalogie.

Metode. Patruzeci de participanti au fost găsiţi eligibili pentru studiu, conform criteriilor de includere şi excludere şi au fost selectaţi prin eşantionare simplă aleatorie. Ei au fost împărţiţi în două grupuri: grupul A – de control şi grupul B - experimental. În fiecare grup au fost eliminaţi câte 2 subiecţi, astfel încât fiecare grup a avut 18 participanţi. Toate performanţele motorii ale copiilor au fost evaluate în prima şi ultima zi de intervenţie folosind TIMPs şi INFANIB. Intervenţia a fost administrată timp de 3 săptămâni, câte 30 de minute de 3 ori pe săptămână. Grupul A a urmat programul de dezvoltare şi grupul B a urmat programul de dezvoltare şi terapia prin muzică.

Rezultate. Analiza statistică a fost efectuată folosind GraphPad InStat 3.06. Semnificaţia statistică a fost stabilită la $p<0,05$. Analiza datelor arată că a fost remarcată o diferenţă între scorul INFANIB şi TIMPs, scor care arată că terapia prin muzică şi program de dezvoltare este eficientă la cei 18 participanţi luaţi în studiu.

Discuţii. A existat o îmbunătăţire semnificativă a activităţii şi vigilenţă a sugarului. Au existat modificări ale componentelor unghiulare franceze ale INFANIB, inclusiv unghiul popliteal.

Concluzii. Terapia prin muzică poate fi utilizată pentru a îmbunătăţi dezvoltarea neuromotorie a sugarilor prematuri. Astfel, aceste strategii pot fi aplicate în mod regulat pentru a ajuta astfel de sugari prematuri pentru a îmbunătăţii vigilenţa şi dezvoltarea lor.

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Introduction

Preterm birth is associated with an increased prevalence of major and minor neurodevelopmental disability. Every year an estimated 15 million babies are born preterm (before 37 completed weeks of gestation) and this number is rising, that is more than 1 in 10 babies. Three-quarters of them could be saved with current, cost-effective interventions.

Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born. Almost 1 million children die each year due to complications of preterm birth. Many survivors face a lifetime of disability including learning disabilities, visual and hearing problems. Incidence of preterm labour is 23.3% and of preterm delivery 10-69% in India. Preterm birth complications are the leading cause of death among children under 5 years of age responsible for nearly 1 million deaths in 2013. [1]

Infants born before 37 weeks of gestational age are considered preterm and infants born before 32 weeks' gestational age are considered very preterm. [2] Preterm birth has been one of the risk factors for developmental disabilities. Infants born preterm may have a lower threshold for sensory input than their full term born peers and have difficulty in tolerating handling and interaction. Among the preterm born infant population it has been indicated that the shorter the gestation, the higher the level of risk factors for the infants. They have found that infants born at earlier gestational ages (< 32 weeks) when compared with later ages (32-36 weeks) scored lower on tests of gross motor development. Thus, time spent in the mother's womb may help to improve and to relate to the quality of motor performance at a later age. In addition to poor quality of postural stability and mobility in the preterm population might be related to differences in experiences such as longer hospital stays, neurological impairment associated with medical complications or immobility due to the constraints of medical technology. [3]

Medical and technological advances in the care of the preterm infant have greatly increased infant survival over the past decades. However, researchers have also noted that medical and nursing procedures and the excessive noise and other stimulation in the NICU environment are stressful for the preterm infant. The American Academy of Pediatrics recommended that environmental noise levels in the NICU should not exceed 45 dB. Much emphasis has been placed on techniques for reducing environmental stress and stimuli such as keeping isolettes dark and quiet as well as minimizing handling of babies. [2]The focus of the highly-trained staff in the NICU has been body system and physiologic support, as well as neuroprotective strategies and neurodevelopmental support however, in comparison with full-term, preterm infants have been found to consistently experience a higher rate of sensory impairments and promote optimal neurological/ behavioral development of these vulnerable premature infants.

More recently the use of structured stimuli (e.g., music therapy) has been encouraged as a means of reducing environmental stress. Other stress reduction techniques that have been employed to minimize environmental stress include clustering of nursery activities, positioning or swaddling of preterm infants, touch/massage therapy, kangaroo care, oral sucrose, non-nutritive sucking, multisensory stimulation and music therapy. The aim of physical therapy program is to optimise motor development and are often based upon the principles of neuro-developmental therapy (NDT) which aims to modify sensory input and/ or abnormal movement patterns to improve motor outcome through active and/or passive techniques. [4,5] Infant stimulation programs may involve multisensory stimulation such as auditory, visual, vestibular and tactile stimulation.

Music therapy has been shown to be very beneficial in stimulating growth and development in premature infants. The coordination for sucking and breathing is often not fully developed, making feeding a challenge. The use of music in the NICU has been shown to decrease the stress response and increase oxygen levels. Womb sound music has been shown

to be very helpful in the care of mechanically ventilated agitated premature babies with low oxygen levels. [6] Musical selections for fragile premature babies must be carefully considered.

The emphasis must be given to simplicity as well as gentle rhythms, flowing and lyrical melodies, simple harmonies and a soft tone. Transient changes in amplitude must be avoided, as well as abrupt tempo changes. Complexity of sound timbre and color should be avoided as well as complex combinations of different instruments. [7]

Objective

This study aims to determine the effect of Music Therapy and Developmental Program on Preterm infants in Neonatal Intensive Care Unit.

Material and Methods

The study was carried out at NICU of Pravara Rural Hospital, Loni (Bk). This is an Experimental study– over study approved by the ethics committee of the institute. Pre-term infant clinically diagnosed by paediatrician were included in this study. Infants with Hypoxic Ischaemic Encephalopathy, any congenital anomalies and genetic disorder were excluded from the study. A written informed consent was obtained after explaining the procedures.

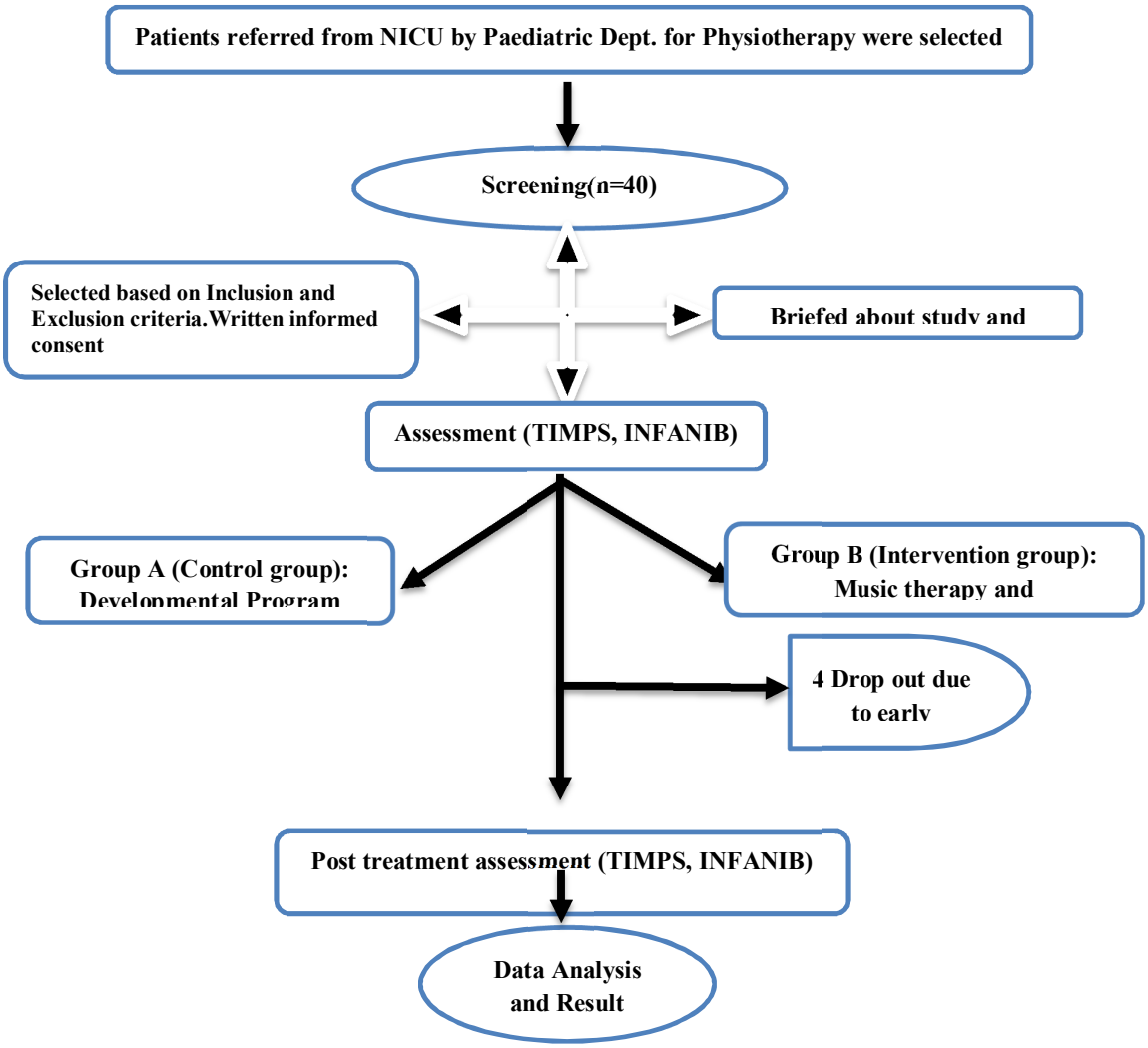


Figure 3.1 Flow Chart representing the procedure of selection of participant

There were total fifty participants who were from the in-patients NICU, referred to Paediatric Physiotherapy, Pravara Rural Hospital, Loni. Forty participants were found eligible for the study, per inclusion and exclusion criteria and they were selected by simple random sampling. They were divided into two groups Group A and Group B. Group A was controlled group and Group B was experimental group. There were 2 drop outs in each group because of early discharge, thus each group had 18 participants. Parents were explained about the nature of the study, the duration of intervention of the study, intervention and its benefits in the language best understood by them. They were encouraged to clarify queries regarding the study, if any. A written informed consent was obtained from their parents. After that demographic details of the participants including Name, Age, Gender, Height and Weight were noted. All infants motor performance was assessed on the first and last day of intervention using TIMPS and INFANIB.

In control group, participants received developmental program and intervention group received developmental program and music therapy. The intervention was planned as 3 weeks and three times a week. The training time duration for every session was approximately 30 minutes. Developmental program involved therapeutic positioning, joint proprioception, tactile facilitation and vestibular facilitation. The developmental program was given during quiet alert state of infant, 30 min before feeding.

Tactile Stimulation-Gentle stroking using gauze for 3 min in a sequence of chest, upper limbs and lower limbs in supine position.

Visual stimulation-Black and white visual stimulation card hung at 8–10 in. from the neonate for 3 min.

Auditory stimulation – Mother chatting with baby while he is laying on the mother lap with face to face contact for control group.

Joint Proprioception

Vestibular Stimulation-Gentle horizontal and vertical rocking for 3 min. Positioning-Side lying position was given using blanket rolls.

In intervention group, developmental program and music therapy was given. In music therapy, soft lullaby of 30–40 dB for 30 min was given using a miniature speaker (PHILIPS, MI 1500, INDIA) and an mp3 player. Developmental program was give as above accept auditory stimulation.

Result

Statistical analysis was done by trial version of Graph Pad InStat (v 3.06) software. Various statistical measures such as mean, standard deviation (SD) and test of significance that is "paired t test'' and "unpaired t test" used for comparing data. The results were concluded to be statistically significant which was seen at the post intervention.

Table 1 Demographic profile of all participants

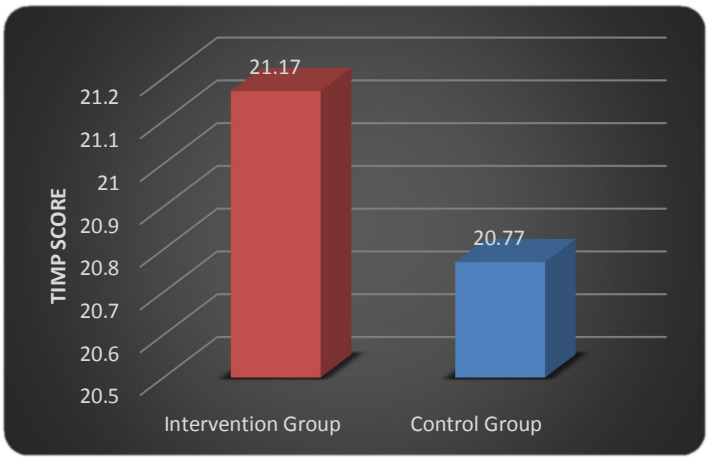
	Demographic characteristics	
	Intervention Group	**Control Group**
Gestational age	**33±2.828**	**33.33±2.808**
Gender ratio (Girls: Boys)	**9:9**	**11:07**

1. Test of Infant Motor Performance (TIMP) score

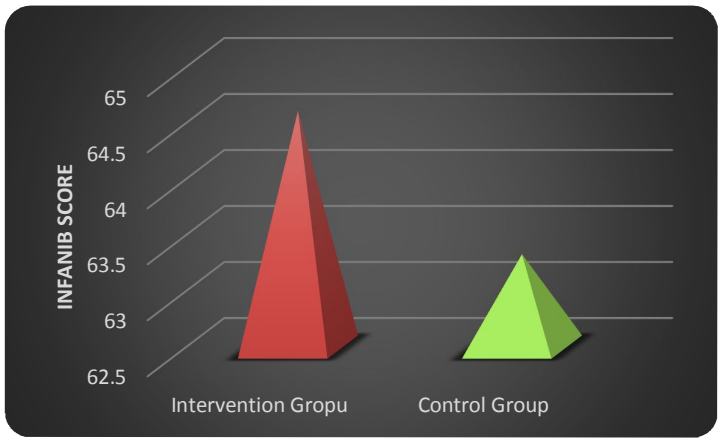
The intervention group mean value of test of infant motor performance score was 21.167 with standard deviation ± 0.5145. The control group mean value of test of infant motor performance score was 20.78 with standard deviation ± 0.4278. Using the "paired t test" the p value is <0.0001 which shows extremely significant difference. The t value 2.715 with a degree of freedom 34.

2. Infant Neurological International Battery (INFANIB) score

The intervention group mean value of infant neurological international battery score was 65.11 with standard deviation ± 1.568. The control group mean value of infant neurological international battery score was 63.22 with standard deviation ± 2.756. The p value is 0.0163 which shows extremely significant difference. The t value 2.528 with a degree of freedom 34.



Graph 1: -Comparison of TIMP Scores at intervention and control group of TIMP Score



Graph 2: -Comparison of INFANIB Scores of intervention and control group

The data analysis shows that there was marked difference in the score of INFANIB and TIMPS score which shows that music therapy is effective in the 36 participants of the study.

Discussion

Interventions that mimic the intrauterine environment may have a beneficial effect on the development of preterm infants and will assist them cope up with the unfavorable environment. Multisensory stimulation (ATVV) has been shown to be safe in stable preterm infants. It helps to improve alertness in preterm babies, festinate the feeding progression and reducing the length of hospital stay.

The foetus from the time of conception is thought to be organizing five distinct but interrelated subsystems: autonomic; motor; state; attention/interaction and self-regulatory. These subsystems continually react and influence each other, thus the term synactive. In babies born before term, the maturation of the five subsystems is interrupted as well as they have lost the uterine supports for these subsystems. The preterm baby is adapted for functioning in the

womb, but is required to function outside the womb at a crucial time in development and, therefore, faces a very challenging existence. [8-10]

The use of music in the NICU has been shown to decrease the stress response and increase oxygen levels. The sound level of lullabies administered was marked to 45–55 dB because it is recommended to support stable vital signs of infants in NICU. Sound is the most effective modality to achieve concurrent decrease in motility along with enhancement of cortical activity. Music can stimulate the many areas of the brain including the Hippocampus which governs the area of long-term memory. Music provide multisensory experience for infants to enhance and encode body movement awareness. It enhances the natural movement and vocalization infants make without words. Infants tend to focus while listening to soothing and sedative music. Children who grow up playing and listening to music develop strong music-related connections in the brain.

Listening to music also helps to develop spatial reasoning. Spatial awareness is the ability to be aware of one self in space. Spatial awareness also involves understanding the relationship of these objects when there is a change of position. Thus, the awareness of spatial relationship is the ability to see and understand two or more objects in relation to each other and to oneself. This is a complexe cognitive skill that children need to develop at an early age.

Music provides multisensory stimulation which helps in enhancing body movement awareness. In this study, there was marked improvement in the score of pre-intervention and post intervention score after a session of music therapy for 3 weeks. There was marked improvement in the activity and alertness of the infant. Music therapy provides balanced sensory stimulation. Infants receiving music therapy session displayed more body movement and vocalization compared to the control group.

There were changes in French angle components of INFANIB including heel to hear and popliteal angle. The limb activity was increased. These responses could indicate an improved alertness and habituation response to sensory stimulation in preterm infants. The infants were turning their head towards the source of music. This will help them for proper visual tracking of toys and help them to explore their surroundings.

Music facilitates the neurogenesis, the regeneration and repair of cerebral nerves by adjusting the secretion of steroid hormones, ultimately leading to cerebral plasticity. The importance of music therapy is the relationship between temporal perceptive processes in the central nervous system and the temporal components of motor learning and performance processes. [11] Music is a complex temporal organization of acoustic events, which is sensed mainly through the auditory modality, which possesses inherent qualities that may be used specific aspects of motor behaviour. Temporal awareness is elaborately related to the coordinated interaction of muscular systems and sensory modalities. Rhythm is the most important aspect of developing a stable temporal world. [12]

It was observed in previous studies that neuronal populations in the cerebellar anterior lobe showed motor associated activity regardless of rhythmic time structure in vermal and hemispheric parts ipsilateral to the movements. It was also observed that neuronal populations in bilateral anterior posterior lobe, mainly the simple lobule, increased their activity stepwise with each increase in tempo modulation from a steady beat. Neuronal populations in other parts of the posterior lobe also showed an increase of activity only during the 20% condition, which involved conscious monitoring of rhythmic pattern synchronization, mainly on the left side contralateral to the movements.[13] It was also observed that music therapy causes auditory and motor interactions which mostly engage the posterior aspects of the superior temporal gyrus and the ventral and dorsal premotor cortex. This helps in initiating Central to Peripheral developmental concept of neuromotor development in infants. Through this, the present study concludes that music therapy has a positive effect on neuromotor development of preterm infants.

Conclusion

The present study shows that the use of music therapy along with developmental program for preterm infant in NICU had similar improvement in TIMPS and INFANIB scoring. Thus, these strategies can be applied on a regular basis for helping such pre-term infants to improve their alertness and to improve their neuromotor development.

Limitations:

The limitations of this study were:

- Smaller duration of intervention
- Small sample size

References

[1] Tessa Wardlaw, Ann Blanc, Elisabeth Åhman (2004) Low Birthweight Country, Regional and Global Estimate. *WHO or UNICEF* December;1-27.

[2] Hodges, Ashley L, Wilson, Lynda L. (2010) Effects of music therapy on preterm infants in the neonatal intensive care unit. *Alternative Therapies in Health and Medicine* Sep/Oct 2010; 16(5):72-73.

[3] Raweewan L, Joan C. (2001) Effect of a developmental program on motor performance in infants born preterm. *Australian Journal of Physiotherapy*; 47:169-176.

[4] Darcy A. Umphred. (2006) *Neurological Rehabilitation. 5th Edition.* Mosby Elsevier;10 Nov. 303-356.

[5] Brown GT, Burns SA. (2001) The efficacy of neurodevelopmental treatment in pediatrics: a systematic review. *British Journal of Occupational Therapy*; 64:235–44.

[6] Collins SK, Kuck K. (1991) Music therapy in the neonatal intensive care unit. *Neonatal Netw.*; 9(6):23–26.

[7] Fred J. Schwartz Ruthann Ritchie, (2007) *Music listening in neonatal intensive care units*;1-23.

[8] Als H. (1982) Toward a synactive theory of development: promise for the assessment and support of infant individuality. *Infant Ment Health J.*;3 (4):229–243.

[9] Als H. (1986) A synactive model of neonatal behavioral organization: framework for the assessment of neurobehavioral development in the premature infant and for support of infants and parents in the neonatal intensive care environment. In: Sweeney JK Ed. The High-Risk Neonate: Developmental Therapy Perspectives. *Phys Occup Ther Pediatr.*; 6:3–55.

[10] Als H, Lawhon G, Brown E, et al. (1986) Individualized behavioral and environmental care for the very low birth weight preterm infant at high risk for bronchopulmonary dysplasia: neonatal intensive care unit and developmental outcome. *Pediatrics.*; 78(6): 1123–1132.

[11] Hajime Fukui, et al. (2008) Music facilitate the neurogenesis, regeneration and repair of neurons. *Medical Hypotheses*; 71(5):765–769.

[12] Michael H. Thaut. (1988) Rhythmic Intervention Techniques in Music Therapy with Gross Motor Dysfunctions. *The* Arts in *Psychotherapy*;15: 127-137.

[13] Michael H. Thaut, et al. (2009) Distinct cortico-cerebellar activations in rhythmic auditory motor synchronization. *Cortex;* 45(1):44-53.

STUDIU PRIVIND EFICIENȚA PROTOCOLULUI MICHIGAN PENTRU TONIFIEREA PLANȘEULUI PELVIN, ÎN MANAGEMENTUL INCONTINENȚEI URINARE DE STRESS, LA FEMEILE TINERE

STUDY REGARDING THE EFICIENCY OF MICHIGAN PROTOCOL FOR PERINEAL MUSCLE STRETGHTENING, IN THE MANAGEMENT OF STRESS URINARY INCONTINENCE, IN YOUNG WOMEN

Ciobanu Doriana Ioana[6], Mărginean Ioana[7]

Keywords: urinary incontinence, perineal muscle strengthening protocol, young momen

Cuvinte cheie: incontinență urinară, tonifierea musculaturii perineale, femei tinere

Abstract

Introduction: Stress urinary incontinence is a major clinical problem of women from modern sciety, with deep effects on quality of life and daily living, being responsible for social, physical, psychological, emotional, occupational and sexual issues.

Scope: This paperwork aimes to prove the efficiency of the Michigan Protocol for Perineal Muscle Stretghtening, in the management of stress urinary incontinence in students from University of Oradea and in the improvement of quality of life, by using a cheap and accessible method, as means and time.

Methodes: Study was conducted on 10 subjects with stress urinary incintinence, mean age 21 ±1,26 years; mean wight 68 kg ±10,76; mean high of 1,67 cm ±0,065; mean mass index 25,183±2,805. Assessment was done by using: General Questionnaire for urinary incontinence, King's Health Questionnaire, PERFECT test. For perineal strengthening, Michgan protocol was used for 6 weeks.

Results: Positive evolution were recorded for stretght, andurance, repetition of contraction, contraction speed, timing and the improvement ov quality of life, in students with mild stress urinary incontinence.

Conclusions: We can say that Michigan protocol is efficient both for the improvement of perineal nuscle tone and for it's parameters, like force, andurance, repetion and contraction speed and also in the improvement of quality of life.

Rezumat

Introducere: Incontinența urinară de stres este o problemă clinică majoră a femeii societății moderne, cu efecte profunde asupra calității vieții și activităților de zi cu zi, implicând suferințe în plan social, fizic, psihologic, ocupațional și sexual.

Scop: Această lucrare dorește să demonstreze eficiența protocolului Michigan în recuperarea/ameliorarea incontinenței urinare de stres la studentele din Universitatea Oradea și la îmbunătățirea calității vieții acestora, printr-o metodă accesibilă și deloc costisitoare nici ca material nici ca timp.

Metode: Studiul s-a realizat pe 10 subiecți cu incontinență urinară de stress, media de vârstă 21 ani ±1,26; greutate medie de 68 kg ±10,76; înălțimea medie de 1,67 cm ±0,065; valoarea medie a IMC-ului este 25,183±2,805. MIjloacele de evaluare utilizate au fost: Chestionar general pentru depistarea incontinenței urinare, King's Health Questionnaire, testul PERFECT. Pentru reeducarea perineală s-a aplicat protocolul Michigan, timp de 6 săptămâni.

Rezultate: S-au observat evoluții pozitive la nivelul planșeului pelvi-perineal ale forței, anduranței, repetițiile contracțiilor, viteza fiecărei contracții, temporizarea ei și în îmbunătățirea calității vieții la studentele cu incontinență urinară de stres în formă ușoară.

Concluzii: Putem spune că protocolul Michigan este eficient atât în creșterea tonusului muscular a mușchiilor pelvi-perineali cât și în funcțiile acestei musculaturi precum forța, rezistența, repetițiile și viteza fiecărei contracții dar și în ceea ce privește unele aspecte ale calității vieții subiecților.

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Introducere

Incontinența urinară este o problemă a femeii societății moderne, o problemă clinică majoră care are efecte profunde asupra calității vieții și activităților de zi cu zi, implicând suferințe în plan social, fizic, psihologic, ocupațional și sexual al pacientelor suferinde. În funcție de importanța și gradul afecțiunii este interferată condiția fizică și psihică a femeii și pot surveni modificări în activitatea și comportamentul social al acesteia. [1]

Potrivit studiilor, numărul de femei din Europa care au incontinență urinară este de ordinul milioanelor. [2], iar incontinența urinară de stres este cea mai comună formă de manifestare a incontinenței urinare la femei (50%). [3] și predomină mai ales la femeile tinere. [4] Incontinența de stres poate apărea la orice vârstă. Pentru unele femei riscul la jena publică le împiedică să se bucure de numeroase activități cotidiene cu familia, prietenii.

Acest tip de incontinență repezintă o pierdere involuntară de urină în timpul oricărei activități fizice care pune presiune pe vezică. Acesta fiind cauzată de slăbiciunea mușchilor vezicii care lasă urina să treacă. Fiind atât de comună în rândul femeilor, de ordinul milioanelor de femei afectate totuși foarte multe dintre acestea refuză să discute cu medicul lor această problemă.

Activitățile care pot supune vezica la acest tip de stres sunt: râsul, strănutul, tusea, ridicarea diverselor obiecte etc. [5]

Anatomia locală este elementul esenţial, de la care porneşte atât depistarea patologiei primare care declanşează dezechilibrul care generează incontinenţa urinară, cât şi cea care va genera, în urma examinărilor specifice, terapia indicată, specifică patologiei date. Imagistica medicală modernă a oferit posibilitatea de a cunoaşte anatomia normală a femeii vii în poziţie ortogradă şi în dinamică, ceea ce a produs o răsturnare a dogmelor stabilite înca din evul mediu. Cercetările ultimilor ani s-au concentrat pe definirea anatomică şi funcţională a structurilor de susţinere a organelor pelvice şi pe biomecanica acestora. [6]

Bazinul moale reprezintă un complex de structuri musculo-aponevrotice. Pereții osoși laterali ai pelvisului sunt acoperiți de mușchiul obturator intern și fascia obturatorie. Peretele posterior este format de sacru și coccis, fiind acoperit în partea laterală de mușchii piriform și coccigian. Planșeul bazinului moale este format din structuri de susținere a viscerelor pelvine și abdominale. Diafragma pelvină este formată din mușchii ischiococcigieni, ridicatori anali (levatori ani) și fasciile care îi acoperă.

În stare normală mușchii ridicători anali împreună cu sfincterul anal extern și sfincterul periuretral, se află în contracție tonică permanentă ceea ce asigură continența vezicii și rectului. În timpul efortului toate componentele musculare se contractă rapid pentru a menține continența.

Acest fapt este posibil datorită constituției specifice a musculaturii striate, care conține fibre musculare cu actiune lentă de tip I, care asigură contracția tonică și fibre cu acțiune rapidă de tip II care pot face față situațiilor unde se cere o acțiune rapidă. În ortostatism, fascicolele pubococcigeu și puborectal au o orientare verticală susținând practic rectul, vaginul și uretra, pe când fascicolul iliococcigeu are o pozitie orizontală biconvexă, formând împreună cu placa levatorie un element de suport în spatele viscerelor pelvice.

În urma studiului bibliografiei autohtone de specialitate nu s-a găsit o statistică în ceea ce privește incidența incontinenței urinare de stres în Romania, dar anumite studii estimează că incontinența urinară afectează una din trei femei, fiind prezentă și în cazul bărbaților, dar mai rar.

Potrivit articolului ″Pelvic Muscle Exercise for Stress Urinary Incontinence in Elderly Women″ (Thelma J. Wells PhD, RN, Carol A. Brink MPH, RN, Ananias C. Diokno MD, Robert Wolfe PhD and Grace L. Gillis MA) protocolul de exerciții urmat de grupul țintă a avut rezultate bune încă mai repede de cât cercetătorii au stabilit. O altă parte bună a fost minimum de exerciții pe zi recomandate care au fost în număr de 80 când trebuiau să fie 125. În concluzie cercetătorii au demonstrat că printre cei care au urmat acest protocol, exercițiile musculaturii pelviene au

fost benefice în reducerea incontinenței urinare de stres, rezultatele fiind comparate cu cele produse de fenilpropanolamină. [7]

În ceea ce privește reeducarea perineală, studiile demonstrează că exercițiile mușchiilor pelvieni au un anumit efect în ceea ce privește calitatea vieții și variabilele vieții sexuale. [8]

Într-un alt studiu cu privire la utilizarea exercițiilor pelviene, Bo Kari (2004) a arătat că acest protocol este eficace în tratamentul incontinenței urinare de stres și mixtă și prin urmare este recomandat ca terapie de primă linie. [9]

Un studiu privind eficiența exercițiilor perineale pentru femei cu incontinență de stress, de urgență și mixtă, au demnostrat că că la 6 luni de la finalizarea unei terapii fără risc, ieftină și simplu de furnizat doar o treime dintre participanții studiului au rămas îmbunătățiți spre satisfacția pacientului. Tot în acest studiu s-a demonstrat că exercițiile au fost la fel de eficiente pentru toate cele trei diagnostice: incontinența urinară de stres, de urgență și mixtă. Cercetătorii au ajuns la concluzia că aceste metode necostisitoare merită o atenție suplimentară, și ar putea fi utilizate de către furnizorii de îngrijire medicală primară pentru a îmbunătății rata de succes a acestei terapii. [10]

Unii cercetători, având ca scop determinarea efectelor exercițiilor musculaturii pelviene în incontinența urinară de stres, au arătat reduceri semnificative ale pierderii de urină și episoadele de pierdere a urinei au scăzut 2.6-1.0 între perioada de control și nivelul PME 4. Femeile care au finalizat studiul au cunoscut o reducere semnificativă a cantității de urină pierdută precum și o creștere semnificativă a caracteristicilor musculare pelvine. [11]

Scop

Această lucrare dorește să demonstreze eficiența protocolului Michigan în recuperarea/ameliorarea incontinenței urinare de stres la studentele din Universitatea Oradea și la îmbunătățirea calității vieții acestora, printr-o metodă accesibilă și deloc costisitoare nici ca material nici ca timp.

Ipoteză

Protocolul Michigan pentru tonifierea musculaturii pelviperineale, aplicat 5 zile pe săptămână, timp de șase săptămâni, influențează pozitiv evoluția incontinenței urinare de stres, prin tonifierea musculaturii fazice, pentru contracții rapide și crește consecutiv calitatea vieții acestor persoane.

Material și metode

Subiecți și locul de desfășurare a cercetării

Studiul s-a desfășurat în perioada decembrie 2015 -mai 2016, în cadrul campusului universitar al Universiății din Oradea.

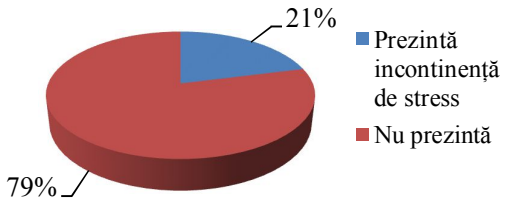
Au fost luate în studiu un număr de 95 subiecți, studente, cu vârste cuprinse între 19-28 ani, media de vârstă 21 ±1,74, cu o greutate cuprinsă între 42- 95 kg, cu o medie a greutății de 59 ±10,33 și înălțimi cuprinse între 1,48 cm-1,87 cm cu o medie a înălțimii de 1,65 ±0,064. Valorile IMC cuprinse între 16,4 și 30,57 iar media IMC fiind 21,48 ±2,97. Dintre cei 95 subiecți chestionați, 33% au declarat un consum de lichide 0,5-1 l, 49% un consum de lichide de 1-2 l și doar 18% consumă peste 2 l de lichide, 55% practică activitate fizică în mod regulat, 41% își amână în mod regulat urinarea și 21% prezintă incontinență urinară de stres. În schimb doar 4 subiecți au declarat că suferă de boli cronice asociate și 92% au apreciat condițiile igieno sanitare din jurul lor ca fiind necorespunzătoare pentru realizarea actului micțional în mod corect.

Tabel. 1. Caracteristicile subiecților (95 subiecți)

Nr. crt.	Caracteristică subiecți	medie ± ab.std.	val. min/ max
1	Vârstă	21±1,74	19/ 28
2	Înălțime	1,65±0,064	1,48/ 1,87
3	Greutate	59±10,33	42/ 95
4	IMC	21,48±2,97	16,4/ 30,57
5	Consum de lichide (nr. de persoane %)	Peste 2 l (18% dintre subiecți), 1-2l (49% dintre subiecți), 0,5-1 l (33% dintre subiecți)	
Procent		DA	NU
6	Activitate fizică	55%	45%
7	Boli cronice associate	4 %	96%
8	Retenția voluntară de urină	41%	59%
9	Prezența incontinenței de stress	21%	79%
10	Condiții igieno-sanitare corespunzătoare	8%	92%

Graficul nr.1 prezintă procentul de subiecți cu incontinență urinară de stres. Astfel, din cei 95 de subiecți, 21% prezintă incontinență urinară de stres.

Dintre cei 20 de subiecți care au declarat că prezintă simptome de incontinență urinară de stres, datorită gradului ridicat de implicare emoțională și a aspectului intim al problemei, doar 50 % au acceptat să urmeze intervenția kinetică și anume protocolul Michigan. Restul de 50% refuză să recunoască că suferă de o astfel de condiție.



Graficul nr.1. Procentajul subiecților care prezintă incontinență urinară de stres

Cei 10 subiecți care au participat la studiu sunt reprezentați în tabelul de mai jos sub forma: vârste cuprinse între 19-23 ani și media de vârstă 21 ani ±1,26; greutate între 58-86 kg și media de 68 kg ±10,76; înălțimi cuprinse între 1,60-1,84 cm și media de 1,67 cm ±0,065; valoarea medie a imc-ului este 25,183±2,805; doar 60 % dintre ei practică activități fizice în mod regulat; 50% au declarat consum de lichide între 0,5-1 l, restul 10% beau peste 2 l de lichide și 40% între 1-2 l; nici unul dintre subiecți nu a apreciat pozitiv condițiile igienico sanitare din campus și 50% obișnuiesc să rețină voluntar urina. Ultimele două afirmații sunt posibili factori ai dezvoltării incontinenței urinare de stres în rândul studentelor. Adoptarea unei poziții incorecte din cauza mediului sanitar nefavorabil frecventat de studente, de exemplu: toaleta din cămine, facultăți și diferite localuri, baruri aduc modificări asupra musculaturii perineale care după cum știm din teorie îndeplinește cele două funcții: de a relaxa musculatura pentru a permite micțiunea și de a se contracta asigurând continența. Media valorilor imc-ului se încadrează în categoria supraponderală ceea ce reprezentă un alt factor de risc al apariției incontinenței urinare după cele spuse și în teorie.

Tabel. 2. Caracteristicile subiecților care prezintă incontinență urinară (10 subiecți)

Nr. crt.	Caracteristici subiecți	medie ± ab.std.	val. min/ max
1	Vârstă	21±1,26	19/ 23
2	Înălțime	1,67± 0,065	1,60/ 1,84
3	Greutate	68± 10,76	58/ 86
4	IMC	25,18±2,805	21,09/ 30,57
5	Consum de lichide	Peste 2 l (10% dintre subiecți), 1-2l (40% dintre subiecți), 0,5-1 l (50% dintre subiecți).	
		DA %	NU %
6	Activitate fizică	60%	40%
7	Condiții igieno-sanitare corespunzătoare	100%	100%
8	Retenția voluntară de urină	50%	50%

Mijloace de evaluare

Chestionar general pentru depistarea incontinenței urinare

În cadrul studiului efectuat s-a folosit chestionarul general de depistare a incontinenței urinare preluat de la Centrul de cercetare pentru Economia Sănătății și Analiza Tehnologiei Sanitare a Universității Corvinus Budapesta, autori dr. Pentek Marta PhD și prof. dr. Gulacsi Laszlo.

Acest chestionar a fost creat în vederea formulării unui raport de cercetare în cadru unui program de investigare a incontinenței și problemelor de micțiune din 2011, care face parte dintr-un program de screening global de protecție a sănătății din Ungaria, între 2010 – 2020.

Chestionarul este format din două părți: chestionarul general și chestionarul pentru incontinența urinară de urgență.

Chestionarul general cuprinde următoarele întrebări: vârsta, greutatea, înălțimea, dacă femeia este expusă la stres permanent, dacă și de când fumează, suferă sau nu de boli cronice asociate cu tuse strănut, cantitatea de lichide consumate zilnic, dacă obișnuiește să își amâne micțiunea, dacă prezintă pierderi involuntare de urină.

Urmează o serie de întrebări legate de pierderea de urină, cum ar fi cantitatea, frecvența și modul în care se pierde urina, tipul de absorbant necesar și întrebări legate de starea fiziopatologică a vaginului și a anusului. Ultimele informații cerute de acest chestionar sunt legate de practicarea sau nu a unei activități fizice regulate și/sau a gimnasticii intime Kegel.

The King's Health Questionnaire cuprinde întrebări referitoare la impactul pe care îl are incontinența urinară asupra calității vieții pacientei. Este format din trei seturi de întrebări, primul set referitor la perceperea stării generale de sănătate de către pacientă și a impactului incontinenței asupra sănătății, al doilea set cuprinde 7 subgrupe de întrebări, referitor la afectarea activităților zilnice, afectarea vieții psihice și sociale, a relațiilor personale, a emoțiilor, afectarea nivelului de energie sau a somnului, dacă pacienta trebuie să recurgă la măsuri speciale pentru incontinență (purtarea absorbantului pentru urină, limitarea aportului de lichide, schimbarea lenjeriei intime în caz de udare, îngrijorarea pacientei cu privire la mirosul care l-ar putea emana). Al treilea set de întrebări încearcă să evalueze tipul de incontinență urinară și cât de mult o afectează pe pacientă (frecvența urinării, existent urinării nocturne, existent controlului micțiunii după apariția senzației de urinare, pierderea de urină in caz de activităși fizice, în timpul actului sexual, existent enuresisului nocturne or a infecțiilor urinare frecvente). Testul se face la începutul tratamentului și după câteva luni de tratament, iar punctajul obținut se compară pentru a vedea dacă există o ameliorare a calității vieții pacientei, în urma tratamentului.

Punctajul testului se calculează după formulele de mai jos, cu cât punctajul este mai mare, cu atât incontinența este mai severă (se compară rezultatele inițiale și finale).

Punctaj minin: 0 puncte

Punctaj maxim: 1000 puncte

Acest chestionar a fost folosit în decembrie 2004 și martie 2006, într-un studiu realizat în Sao Paolo, Brazilia, privind determinarea ameliorării calității vieții la un an după intervenția chirurgicală folosită ca tratament în incontinența urinară de stres sau mixtă. La test au luat parte 39 de persoane, cu vârsta medie 57.8 ani. După un an, chestionarul a arătat ameliorarea calității vieții la 36 de pacienți, 92.3%, restul de 3 având aceleași rezultate. [12]

Testul pentru tonusul musculaturii perineale (testul jetului de urină)

Testul jetului de urină constă în încercarea pacientei de a-și opri jetul de urină în timpul micțiunii. Are mai multe grade:

grad 0 – nu se poate opri jetul de urină

grad 1 – jetul de urină se poate opri parțial

grad 2 – oprește jetul de urină, dar nu poate să țină mult contracția sfincterului urinar voluntar, pentru că obosește

grad 3 – oprește jetul de urină și poate menține

Acest test este simplu de făcut, necostisitor şi de aceea se face în mod curent, ca un test de rutină de către medicul ginecolog sau urolog, pentru stabilirea diagnosticului de incontinenţă urinară.

Testul de evaluare a incontineţei urinare PERFECT constă în evaluarea planşeului pelvi-perineal, în ceea ce priveşte forţa (presiunea), anduranţa, repetiţiile contracţiilor, viteza fiecărei contracţii, temporizarea ei (Power, Endurance, Repetitions, Fast, Every, Contraction, Timed). Prin introducerea unui deget în vaginul pacientei se evaluează tonusul şi funcţia musculaturii pelvi-perienale prin estimarea funcţiilor de mai sus.

***Anduranţa/ Rezistenţa*:** Rezistenţa reprezintă durata contracţiei (până la 10 sec.) care poate fi realizată de muşchi înainte ca forţa contracţiei să scadă cu 35% sau mai mult.Cu alte cuvinte, se măsoară timpul menţinerii unei contracţii până la apariţia oboselii. Un semn al oboselii este contracţia simultană a adductorilor şoldului şi fesierilor şi o puternică cocontracţie a transversului abdominal. Apneea trebuie descurajată; dacă acest lucru se întâmplă, pacienta este instruită să contracte musculatura în timpul expirului. De ex. 3/5 = gradul 3 menţinut 5 secunde.

***Numărul de repetări*:** Numărul de repetări (până la 10) a contracţiei muşchilor pelviperineali cu pauză de 4 secunde între ele. Cele 4 secunde vor permite muşchiului slab, care oboseşte uşor, să îşi revină fără a permite perioade mari de odihnă pentru muşchii puternici. De ex. 3/5/3 grad 3/ menţinut 5 sec./ 3 rep.

Viteza de contracţie: După o scurtă perioadă de repaus (de cel puţin 1 min.), se va cere efectuarea a 10 contracţii de 1 sec. Subiectul este instruit să contracte-relaxeze cât de repede şi de tare posibil, în ritm propriu, până la apariţia oboselii musculare. Mulţi pacienţi pot efectua mai mult de 10 contracţii rapide, dar din motitve practice, în evaluare se cer doar 10. În timpul şedinţelor de reeducare se poate face o evaluare intermediară a numărului de contracţii rapide pînă la apariţia oboselii, care să ofere informaţii asupra progresiei.

Exemplu de rezultat al testului PERFECT: 4/6/5//9 = **grad 4** (contracţie bună, menţinută **6 sec.,** repetate de **5 ori**, urmate de **9 contracţii rapide**).

Scopul evaluării PERFECT este de a determina numărul de contracţii necesare solicitării muşchiului şi de a dezvolta un program de exerciţii adecvat şi eficient.

Identificarea muşchilor perineali:

1. În timpul micţiunii
2. Se începe golirea vezicii.
3. Se va încerca oprirea jetului de urină când e jetul mai puternic, prin contracţia muşchilor planşeului pelvin.
4. Se repetă acţiunea de câteva ori pentru familiarizarea cu senzaţia contracţiei muşchilor corecţi. Nu se contractă fesele, abdomenul, coapsele.

Pentru exprimarea numerică a acestei evaluări se foloseşte **scala Oxford modificată**, referitoare la contracţiile musculaturii pelvi-perineale. Se pot folosi semnele ”-” şi ”+”.

Grad 0 – Nu se percepe contracţie musculară

Grad 1 – contracţie abia perceptibilă/ pulsaţie simţită de degetul examinatorului.

Grad 2 – tensiune crescută detectată dar fără sesizarea ridicării peretelui vaginal.

Grad 3 – tensiune musculară crescută şi perceperea ridicării peretelui vaginal posterior. Contracţia de grad 3 se percepe ca o strângere a anusului şi perineului.

Grad 4 – sunt prezente o tensiune crescută şi o contracţie bună, capabile să ridice peretele posterior al vaginului contra rezistenţei (presiune digitală aplicată pe peretele posterior vaginal).

Grad 5 – se aplică o rezistenţă puternică la ridicarea peretelui vaginal posterior; degetul examinatorului este strâns şi tras în vagin.

Scala Oxford modificată: (0-contracţie inexistentă, 1-perceptibilă, 2-slabă, 3-moderată, 4-bună, 5-puternică).

Mijloace de intervenţie kinetică

Protocolul Michigan / Program de exerciţii pentru muşchii planşeului pelvin

Tratamentul efectuat de subiecţi a fost un program de reeducare pelvi-perineală, care a încercat să demonstreze că poate influenţa evoluţia/ ameliorarea incontinenţei urinare, la studente. A constat în efectuarea timp de 6 săptămâni a protocolului de exerciţii pentru musculatura planşeului pelvin.

Prima parte din cadrul tratamentului, a constat în învăţarea subiecţilor să diferenţieze şi să contracte musculatura pelvi-perineală. Pentru aceasta au fost îndrumate să încerce să îşi oprească jetul de urină, într-un moment în care senzaţia de urinare nu este intensă şi să simtă contracţia musculaturii planşeului pelvin. La început, pacientele nu au fost sigure de contracţia făcută, tocmai de aceea ele au fost sfătuite să încerce într-un alt mod: să îşi introducă un deget în vagin şi să contracte din nou musculatura pelvi-perineală, ca atunci când urmăreşte să îşi oprească jetul de urină. În acest fel, vor simţi muşchii planşeului pelvic contractându-se în jurul degetului. Pentru ca exerciţiul să fie efectuat corect, este foarte important ca pacientele să nu contracte musculatura abdominală, fesieră şi adductorii coapselor, ştiut fiind faptul că aceşti muşchi sunt sinergici cu muşchii planşeului pelvin.

Odată identificată musculatura pelvină şi învăţată contracţia corectă, s-a trecut la a doua parte a tratamentului, protocolul propriu-zis.

Nivelul 1: **Lovituri**

Scop: Contracţii rapide şi uşoare; se începe învăţarea contracţiilor muşchilor pelvieni.

Se evită flexia trunchiului, întinderea sau încordarea spatelui.

Se evită contracţia muşchilor abdominali, coapselor, feselor.

Indicaţii (dozare): 10 contracţii scurte /set; 5 seturi /zi

cu pauză de 30 secunde între fiecare set ⟵ 1 set ⟶

Timp minim: 5 minute zilnic/ 5 zile pe săptămână**.**

^ ^ ^ ^^ ^ ^ ^

Nivelul 2: Stacking/Stivuire

Scop: Contracţii scurte,în trepte, pentru a recruta mai complet muşchii pelvieni.

Contracţii realizate ca şi contracţii cu creşterea progresivă a intensităţii în 2-3 trepte.

Număraţi ″1, 2, 3 (menţinere) şi relaxaţi″, la fiecare treaptă de creştere a intensităţii.

Indicaţii: 10 contracţii/ set; 5 seturi/ zi

cu pauză de 30 secunde între fiecare set

Timp minim: 5 minute zilnic/ 5 zile pe săptămână.

Nivelul 3: Rezistenţă

Scopul: Contracţii menţinute cu intensitate moderată, pentru a începe să creşteţi durata contracţiilor.

Executaţi contracţii cu intensitate progresivă, sau contracţii alternante rapide şi uşoare.

Direcţionaţi forţa contracţiei spre înauntru şi în sus.

Menţineţi fiecare contracţie 3 secunde (încercaţi să menţineţi progresiv până la 10 secunde).

În timp ce menţineţi contractaţi muşchii ferm şi cât de tare puteţi, fără să vă forţaţi.

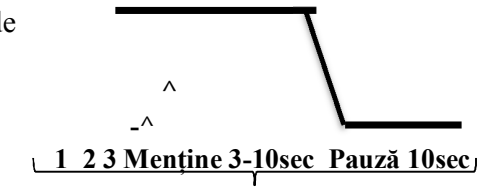
Indicaţii: 10 contracţii/ set; 3 seturi/ zi

Se menţine fiecare contracţie 3-10 secunde

Cu pauză de 10 secunde între contracţii

Cu pauză de 30 secunde între seturi

Timp minim: 10 minute zilnic/ 5 zile pe săptămână



1 contracție
(Trebuie repetată de 10X pt a forma un set)

Nivelul 4: **Intensitate mare**

Scop: Contracții maximale, de intensitate mare, pentru a crește masa musculară și forța

Mențineți contracția la maximum de intensitate până la apariția oboselii.

Concentrați-vă să mențineți contracția fără a vă forța prin contracții pulsate cu menținere.

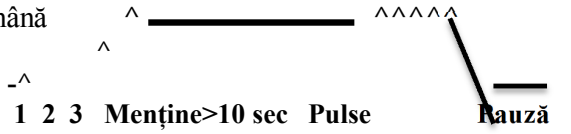
Indicații: 5 contracții/ set; 3 seturi/ zi;.

Mențineți fiecare contracție >10 secunde, contracții pulsate și menținere

Pauză de 10 secunde între contracții

Pauză de 30 secunde între seturi

Timp minim: 10 minute zilnic/ 5 zile pe săptămână



1 contracție
(Trebuie repetată de 5X pt a forma un set)

Nivelul 5: Întreținere

Scop: Continuați contracțiile active ale mușchilor planșeului pelvin astfel să devină o rutină în cadrul activităților zilnice de autoîngrijire.

Concentrați-vă să realizați activ și conștient contracția mușchilor planșeului pelvin înainte de strănut, tuse sau ridicări.

Mențineți nivelul optim de forță musculară practicând regulat nivelul 5 de contracții.

Indicații: 5 contracții/ set; 2 seturi/ săptămână sau mai mult, astfel încât să se potrivească în rutina zilnică.

Mențineți fiecare contracție >10 secunde, contracții pulsate și menținere

Pauză de 10 secunde între contracții

Pauză de 30 secunde între seturi

Timp minim: 5-10 minute / săptămână *(vezi figura de mai sus)*. [13]

Rezultate și discuții

În urma screening-ului privind prevalența incontinenței urinare, realizat pe cele 95 de studente din campusul universitar, s-a constatat că un procent de 21% studente prezintă incontinență urinară de stres. Rezultatele obținute în urma evaluărilor inițiale și finale aplicate grupului experimental (10 subiecți) au fost prelucrate și analizate cu ajutorul programului Excel, calculându-se media și abaterea standard pentru variabilele numerice și procentul pentru variabilele dihotomice. Prezentarea rezultatelor s-a realizat sub formă de tabele și grafice.

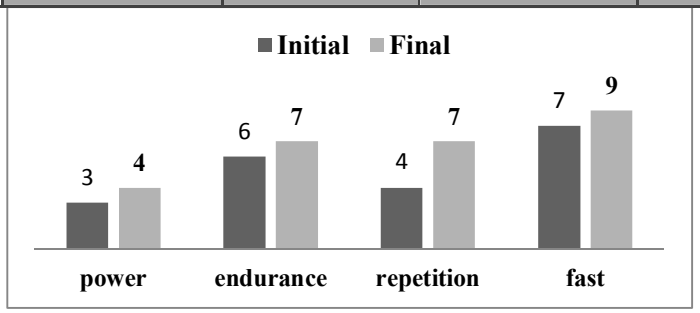
Tabel .3. Rezultate inițiale și finale ale grupului de studiu la chestionarul general de screening pentru incontinență urinară/ nr.10)

Nr. crt.	Caracteristici subiecți	Procent inițial stud. %	Procent final stud. %
1	**Cantitatea**	1-2 pic **90% stud**.	**30% stud**.
		Cantit. mai mare **10%**	**0% stud.**
		Tot conținutul **-**	**-**
2	**Frecvența**	Rar **80%**	**30% stud**.
		Des **20%**	**0%stud.**
		Sistematic **-**	**-**
3	**Cauza**	**40% stud.** - râs,sărituri mici **50% stud.** - tuse,strănut **10% stud.** - susur,curgere apă	**20% stud.** - susur,curgere apă **10%** stud.- strănut,tuse
4	**Nevoia folosirii absorbantului**	NU 100% stud.	100% stud.
5	**Senzație vagin larg**	DA -	-

		NU	100% stud.	100% stud.
6	**Senzație de pătrundere a aerului în vagin**	DA	20% stud.	-
		NU	80% stud.	100% stud.
7	**Scurgerea apei din vagin după baie, înot**	DA	30% stud.	10% stud.
		NU	70% stud.	90% stud.
8	**Contact intim dureros**	DA	-	-
		NU	100% stud.	100% stud.
9	**Flatulență, constipație**	DA	-	-
		NU	100% stud.	100% stud.
10	**Hemoroizi, varice în zona intimă**	DA	-	-
		NU	100% stud.	100% stud.
11	**Practicarea regulată a gimnasticii intime**	DA	-	100% stud.
		NU	100% stud.	-
12	**Ati auzit despre gimnasatica intimă și eficiența ei?**	DA	20% stud.	100% stud.
		NU	80% stud.	-
13	**Condițiile de igienă**	NU	100%	-
14	**Obezitate**	DA	60%	
		NU	40%	

Pentru evaluarea eficienței protocolului Michigan aplicat, s-au folosit: Testul pentru tonusul musculaturii perineale (testul reținerii jetului de urină), Testul PERFECT și King´s Health Questionnaire.

Nr.crt.	Power/ Forță medie±ab.std	Endurance/ Rezinstență	Repetitions/Nr. repetări	Fast/ Nr. contracții rapide
I	3 ± 1,05	6± 2.00	4 ± 1,37	7 ± 1,98
F	4± 0,966	7± 2,201	7± 2,273	9± 1,577

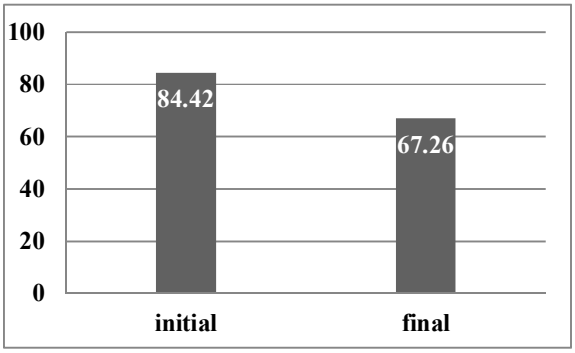


Graficul nr.2. Diferența dintre rezultatele inițiale și finale ale testului PERFECT

Graficul nr.2 prezintă rezultatele comparative ale evaluărilor inițiale și finale la testul PERFECT.

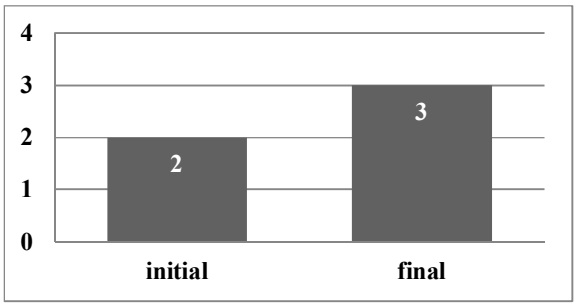
Inițial rezultatul primului criteriu de evaluare ″power/forța″ a subiecților a fost gradul 3. Potrivit scalei Oxford modificată acesta reprezintă o contracție a musculaturii pelvi-perineale moderată. La reevaluare după cele 6 săptămâni de exerciții se observă o contracție vaginală mai puternică de la gradul 3 contracție moderată la gradul 4 contracție bună. La cel de al doilea criteriu ″endurance/rezistența″ valoarea medie inițială a subiecților a fost de 6 secunde, în final se poate observa că subiecții au reușit să mențină contracția înainte ca forța contracției să scadă, în medie timp de 7 secunde, valoarea maximă fiind 10 secunde.

Graficul nr.3 prezintă comparația rezultatelor finale față de cele inițiale sub formă de medie și abatere standard la chestionarul King′s Health. Acest chestionar evaluează impactul incontinenței urinare de stres asupra calității vieții subiecților luați în studiu. Cu cât scorul pacienților este mai mic aproape de 0 cu atât impactul asupra calității vieții este mai scăzut



Graficul nr.3. Diferența dintre rezultatele inițiale și finale ale chestionarului King´s Health sub formă de medie

Graficul nr.4 reprezintă compararea rezultatelor inițiale și finale sub formă de medie ale tonusului musculaturii perineale utilizând testul reținerii jetului de urină. Se poate observa că la evaluarea inițială majoritatea studentelor reușeau să oprească jetul de urină dar nu reușeau să mențină mult timp contracția sfincterului voluntar deoarece obosește (gradul II). În urma protocolului Michigan, la evaluarea finală s-a observat că tonusul musculaturii s-a îmbunătățit ceea se înseamnă că subiecții nu numai că rețin jetul de urină ci sunt capabili să îl și mențină. Astfel putem spune că protocolul Michigan pentru creșterea tonusului musculaturii pelvi-perineale este eficient în creșterea forței acestei musculaturi.



Graficul nr.4. Diferența dintre rezultatele inițiale și finale

ale testului jetului de urină

Discuții

Cele care au acceptat să urmeze protocolul Michigan, au constituit grupul experimental. Acestea au fost supuse evaluării inițiale, respectiv evaluării finale, după 6 săptămâni, la terminarea protocolului Michigan. În urma aplicării chestionarului general de screening pentru incontinență urinară, s-au obținut următoarele informații referitoare la cauze, frevența, cauza și percepțiile subiecților cu privire la tonusul planșeului pelvin, prezentate în tabelul 4.

Inițial majoritatea subiecților (90%) pierdeau o cantitate de 1-2 picături restul de 10% pierdeau o cantitate mai mare de urină. Cauza este împărtită aproximativ egal între ″râs, sărituri mici″ (40%) și ″tuse, strănut puternic în prealabil″ (50%). În ceea ce privește frecvența, inițial doar 20% pierdeau urină mai des, restul de 80% subiecți rar. După intervenția kinetică 30% au afirmat că încă mai pierd o cantitate de 1-2 picături de urină dar mai rar decât inițial iar subiectul care pierdea o cantitate mai mare de urină a ajuns să piardă 1-2 picături. Cele 2 studente care încă pierdeau urină, se întâmpla la curgerea de apă, susur, deoarece această activitate nu necesită o presiune intraabdominală așa mare și un singur subiect la strănut, tuse. La senzația de pătrundere a aerului în vagin 20% au răspuns pozitiv respectiv la senzația scurgerii apei din vagin după baie, înot 30% au răspuns pozitiv. Se mai poate observa că nici unul dintre subiecți nu necesita folosirea absorbantului pentru urină, nu aveau senzația de vagin larg, nu prezentau hemoroizi sau varice în zona intimă nici flatulență sau constipație și nici contactul intim nu era dureros.

În urma rezultatelor chestionarului general de screening pentru incontinență urinară, valorile IMC-ului fiind mari la 60% dintre subiecți, putem afirma că greutatea corporală reprezintă un factor semnificativ în apariția incontinenței urinare. Cu cât o femeie are o greutate corporală și un indice de masă corporală mai mare, probabilitatea de a face incontinență urinară

creşte direct proporţional cu acestea. Se ştie din teoria integrală a lui Papa Petros că mijlocul „universului pelvin" este vaginul, astfel orice alterare a elementelor lui de susţinere va genera alterări ale compartimentelor lui cu consecinţa apariţiei prolapsurilor genitourinare. [14] Aceste consecinţe se răsfrâng şi asupra vezicii urinare, o greutate corporală mai mare generând o presiune mai mare asupra planşeului pelvi-perineal. În timp, acesta duce la alterarea elementelor de susţinere şi a fibrelor musculare din componenţa vezicii urinare.

La aceeaşi concluzie au ajuns şi autorii studiului Nonsurgical Treatments for Urinary Incontinence in Adult Women: Diagnosis and Comparative Effectiveness. Din 99 de studii efectuate cu paciente care prezentau un minimum de incontinenţă urinară, s-a ajuns la concluzia că obezitatea favorizează apariţia incontinenţei urinare, iar pierderea în greutate la femeile obeze duce la ameliorarea incontinenţei. [15] Obezitatea a fost identificată ca factor de risc pentru incontinenţa urinară în multe studii epidemiologice. Există dovezi clare că prevalenţa incontinenţei urinare creşte proporţional cu creşterea indicelui de masă corporală. [15]

Iniţial subiecţii au reuşit să contracte musculatura pelvi-perineală în medie de 4 ori (4 repetări din 10 cât e maxim). După programul de exerciţii efectuat, la evaluarea finală s-a constatat creşterea numărului de repetări de la 4 la 7. La cererea efectuării a 10 contracţii de 1 secundă(criteriul ″fast″) iniţial subiecţii au reuşit în medie doar 7 contracţii iar în final după efectuarea protocolului Michigan subiecţii au executat 9 contracţii de 1 secundă. În concluzie se poate afirma că protocolul Michigan pentru musculatura pelvi-perineală aduce modificări pozitive la nivelul planşeului pelvi-perineal în ceea ce priveşte forţa, anduranţa, repetiţiile contracţiilor, viteza fiecărei contracţii, temporizarea ei (Power, Endurance, Repetitions, Fast, Every, Contraction, Timed.

Media scorurilor globale iniţiale la subiecţii noştri a fost 84,42, raportat la valoare minimă a chestionarului ne arată faptul că la pacienţii luaţi în studiu incontinenţa urinară prezentă nu afectează major calitatea vieţii lor. Astfel am luat în calcul doar acele niveluri ale chestionarului (tabel nr.7) unde studentele au raportat o jenă şi anume: nivelul 4 ″Limitări fizice/sociale″ şi respectiv nivelul 8″ Faceţi una dintre următoarele? dacă da, cât de mult?″ Scorul global final a scăzut de la 84,42 puncte la 67,26 puncte ceea ce arată că protocolul Michigan îmbunătăţeşte unele aspecte ale calităţii vieţii, în cazul de faţă ameliorarea s-a produs la nivelele 4 şi 8 ale chestionarului. Astfel că incontinenţa urinară de stres nu foarte severă a subiecţilor la început prezenta unele reţineri în ceea ce priveşte activităţile fizice de genul: mers, alegare, sport etc, afectarea capacităţii de a călători (nivelul 4); necesitatea tampoanelor intime, reţinerea în a bea lichide, etc.(nivelul 8). În urma practicării exerciţiilor din protocolul Michigan toate aceste aspecte ale nivelului 4 şi 8 a chestionarului King s Health s-au îmbunătăţit sau chiar au dispărut. În urma acestor constatări putem menţiona faptul că protocolul Michigan are eficacitate în îmbunătăţirea calităţii vieţii la subiecţii cu incontinenţă urinară de stres în formă uşoară.

Concluzii

În urma rezultatelor chestionarului general de screening pentru incontinenţă urinară, valorile IMC-ului fiind mari la 60% dintre subiecţi, putem afirma că greutatea corporală reprezintă un factor de risc în apariţia incontinenţei urinare.

În urma celor două screeninguri pentru incontinenţa urinară pe cei 95 de subiecţi şi respectiv cei 10 care au format lotul experimental pare a se adeveri faptul că, condiţiile proaste de igienă ceea ce atrage după sine realizarea incorectă a actului micţional contituie un factor de risc în apariţia incontinenţei urinare de stres la femeile tinere.

Protocolul Michigan pentru musculatura pelvi-perineală aduce modificări pozitive la nivelul planşeului pelvi-perineal în ceea ce priveşte forţa, anduranţa, repetiţiile contracţiilor, viteza fiecărei contracţii, temporizarea ei (Power, Endurance, Repetitions, Fast, Every, Contraction, Timed. Protocolul Michigan are eficacitate în îmbunătăţirea calităţii vieţii la subiecţii cu incontinenţă urinară de stres în forma uşoară. Protocolul Michigan pentru creşterea tonusului musculaturii pelvi-perineale este eficient în tonifierea acestei musculaturi.

În concuzie, putem spune că protocolul Michigan este eficient atât în creşterea tonusului muscular a muşchiilor pelvi-perineali cât şi în funcţiile acestei musculaturi precum forţa, rezistenţa, repetiţiile şi viteza fiecărei contracţii dar şi în ceea ce priveşte unele aspecte ale calităţii vieţii subiecţilor.

Referinţe bibliografice

[1] M.G.Lucas (chair) & colab, (2013) *Guidelines on Urinary Incontinence*, European Association of Urology, www.uroweb.org/gls/pdf/20%20Urinary%20Incontinence_LR.pdf

[2] S. Hunskaar , G. Lose, D. Sykes, S. Voss, (2004) The prevalence of urinary incontinence in women in four European countries, *BJUI International, Section for General Practice, Department of Public Health and Primary Health Care*, University of Bergen, Ulriksdal 8c, N-5009 Bergen, Norway.

[3] V.A. Minassian, (2003), Urinary incontinence as a worldwide problem, *International Journal of Gynecology & Obstetrics*, Division of Urogynecology and Reconstructive Pelvic Surgery, Department of Obstetrics and Gynecology, University of Toronto, Mount Sinai Hospital, Toronto, Ontario, Canada.

[4] Thom, D., (1998) Variation in estimates of urinary incontinence prevalence in the community: effects of differences in definition, population characteristics, and study type", *Journal of the American Geriatrics Society*

[5] Borza, C., (2011), *Incontinenţa urinară datorată defectului de perete vaginal anterior*, Teză de doctorat – rezumat, Oradea, arhiva-www.uoradea.ro/attachment/.../Borza_Ciprian_Tudor_rezumat.pdf

[6] Thelma J. Wells PhD, RN, Carol A. Brink MPH, RN, Ananias C. Diokno MD, Robert Wolfe PhD and Grace L. Gillis MA, (1991) Pelvic Muscle Exercise for Stress Urinary Incontinence in Elderly Women, *Journal of the American Geriatrics Society*, vol.39, issue 8, pg.785-791.

[7] Bo K., Trygve Talseth & Anne Vinsnes, (2000) Randomized controlled trial on the effect of pelvic floor muscle training on quality of life and sexual problems in genuine stress incontinent women, *Acta Obstetricia et Gynecologica Scandinavica*, vol. 79, issue 7, pages 598-603.

[8] Bo K. (2004) Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work?, *Int Urogynecol J*;15:76–84.

[9] Nygaard IE, Kreder KJ, Lepic MM, Fountain KA, Rhomberg AT, Efficacy of pelvic floor muscle exercises in women with stress, urge, and mixed urinary incontinence, *Am J Obstet Gynecol. 1996 Jan*; 174(1 Pt 1):120-5. Department of Obstetrics and Gynecology, University of Iowa College of Medicine, Iowa City, USA

[10] Dougherty M, Bishop K, Mooney R, Gimotty P, Williams B., Graded pelvic muscle exercise. Effect on stress urinary incontinence, *J Reprod Med.* 1993 Sep;38(9):684-91, College of Nursing, University of Florida, Gainesville 32610-0197

[11] Janis Miriam Miller (2012) *On Pelvic Floor Muscle function and Stress Urinary Incontinence: Effects of Posture, Parity and Volitional Control,* Dissertation, University of Michigan, pag. 145-157.

[12] Lautenschlager M A, Figueiredo R C B, Arruda R, Ribeiro G, Fonseca E S, Girão M J B, Sartori M G, (2007) *Quality Of Life-King's Health Questionnaire- Outcomes One Year After Inside-Out Transobturator Tape (TVT-O) Surgery For Treatment Of Rrecurrent Stress Urinary Incontinence*, Federal University of São Paulo (UNIFESP) and Hospital do Servidor Público Estadual (HSPE), Hospital do Servidor Público Estadual (HSPE), Federal University of São Paulo (UNIFESP)

[13] Peter E. Papa Pedros, Ulf I. Ulmsten, An Integral Theory of Female Urinary Incontinence

Acta Obstetricia Et Gynecologica Scandinavica, vol 69, Suplement 153, Editura Almqvist&Wiksell International, Stokholm, Sweden, ISSN 0-300,8835

[14] Tatyana Shamliyan, Jean Wyman, Robert L. Kane, April 2012, *Nonsurgical Treatments for Urinary Incontinence in Adult Women: Diagnosis and Comparative Effectiveness*, Minnesota Evidence-based Practice Center Minneapolis, Minnesota, AHRQ Publication No. 11(12)-EHC074-EF, Contract No. 290-2007-10064-I

[15] M.G.Lucas (chair)&colab, (2013*) Guidelines on Urinary Incontinence*, European Association of Urology, www.uroweb.org/gls/pdf/20%20Urinary%20Incontinence_LR.pdf

A COMPARATIVE STUDY OF THE EFFECTS OF INCENTIVE SPIROMETRY AND DIAPHRAGMATIC RESISTANCE TRAINING ON SELECTED CARDIOPULMONARY PARAMETERS IN PATIENTS WITH ASTHMA

STUDIU COMPARATIV PRIVIND EFICIENȚA SPIROMETRIEI STIMULATORII ȘI A ANTRENAMENTULUI DE REZISTENȚĂ A DIAFRAGMULUI ASUPRA PARAMETRILOR CARDIOPULMONARI SELECTAȚI, LA PACIENȚII CU ASTM

Happiness A Aweto [8], Ayoola I Aiyegbusi[9], Zainab O Olaniyan[10]

Keywords: Asthma, Incentive spirometry, Diaphragmatic resistance training, Aerobic exercises

Abstract

Background: The primary goal of asthma management is to achieve and maintain control of the disease in order to prevent exacerbations. Evidence suggests that moderate intensity aerobic exercise training programme as well as incentive spirometry (IS) and diaphragmatic resistance training (DRT) improve asthma control and lung function. There is however no clear consensus regarding the comparative efficacy of DRT and IS on the cardiopulmonary parameters of patients with asthma.

Aim. This study was therefore aimed at comparing the effects of incentive spirometry and diaphragmatic resistance training on selected cardiopulmonary parameters in patients with asthma.

Methods: Forty-five (45) participants between the ages of 21 and 65 years diagnosed with asthma by physicians were recruited from the out-patient respiratory clinic of the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos State, Nigeria and randomly assigned to three (3) groups (A, B and C) Group A received aerobic exercises and IS, Group B received aerobic exercise and DRT and Group C (control group) received only aerobic exercise for 6 weeks; 3 times a week.

Results: There were significant changes post-intervention in all the pulmonary parameters ($p<0.05$) of the three groups while there were no significant changes in any of the cardiovascular parameters ($p>0.05$). A comparison of the mean values of the cardiopulmonary parameters across the three groups 6th week post intervention show significant differences for FEV_1 and PEFR (*p=0.016* and *p=0.030* respectively) while no significant differences existed in FVC and the cardiovascular variables (SBP and DBP) (p= 0.100, p= 0.739, p= 0.874 respectively).

On post hoc analysis using the least significant difference (LSD), the significant difference observed in FEV1 was found between Groups B&C and A&B. Furthermore, the significant difference observed in PEFR was found between Group B&C.

Conclusion: Our findings show that the use of IS and DRT ha beneficial effects in improving selected pulmonary parameters (FEV FVC, PEFR). However, the use of DRT is clinically more benefici and is thus recommended to be a part of the intervention for patier with asthma.

Cuvinte cheie: astm, spirometrie stimulatorie, antrenament de rezistență diapfragmatică, exerciții aerobe

Rezumat

Introducere: Scopul primar al managementului bolii astmatice este de a obține și menține controlul afecțiunii, pentru a preveni exacerbările. Studiile sugerează că programele de exerciții cu intensitate moderată, precum și spirometria stimulatorie (IS) și antrenamentul de rezistență a diafragmului (DRT) îmbunătățesc controlul astmului și funcția pulmonară. Nu există totuși un consens clar referitor la compararea eficienței DRT și IS asupra parametrilor cardiopulmonari la pacienții cu astm.

Scop. Acest studiu dorește să realizeze o comparație între efectul spirometriei stimulatorii și a antrenamentului de rezistență a diafragmului asupra parametrilor cardiopulmonary selectați, la pacienții cu astm.

Metode: Patruzeci și cinci (45) de participanți cu vârste cuprinse între 21 și 65 de ani, diagnosticați cu astm, din clinica ambulatorie respiratorie a spitalului Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos State, Nigeria au fost recrutați și distribuiți aleator în trei (3) grupuri (A, B și C). Grupul A a urmat un program de execiții aerobice și IS, groupul B a urmat exerciții aerobice și DRT și grupul C (de control) a urmat doar exerciții aerobice timp de 6 săptămâni; de 3 ori/ săptămână.

Results: S-au înregistrat modificări semnificative după intervenții, la toți parametrii pulmonari ($p<0.05$) la toate cele trei grupuri, și nu s-au înegistrat modificări semnificative ale parametrilor cardiovasculari ($p>0.05$). Compararea valorilor medii are parametrilor cardiopulmonari între cele trei grupuri în a șasea săptămână post intervenție, ademonstrat diferențe semnificative pentru FEV_1 și PEFR (*p=0.016* și respectiv *p=0.030*), în vreme ce nu s-au inregistrat diferențe semnificative ale FVC și variabilele cardiovasculare (SBP and DBP) (p= 0.100, p= 0.739, respectiv p= 0.874).

La analiza posthoc, folosind cea mai mica diferență semnificativă (LSD), s-a demonstrate o diferență semnificativă la FEV1, între grupurile B&C și A&B. Mai mult, diferența semnificativă observată la PEFR a fost între grupurile B&C.

Concluzii: Rezultatele demonsterază că folosirea IS și DRT are efete benefice în îmbunătățirea parametrilor pulmonari selectați (FEV_1, FVC, PEFR). Totuși, folosirea DRT este mult mia benefică din punct de vedere clinic, fiind de aceea recomandat a face parte din programul de intervenție la pacientul astmatic.

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Introduction

The incidence of asthma with its associated high healthcare cost has increased over the last three decades, especially in industrialized countries. [1] The rising morbidity and mortality from asthma despite major advances in the understanding of the disease process can be attributed to inadequate attention given to the management of asthma by improving bronchial asthma control. [2] Though clinical control of asthma can be achieved with proper pharmacological treatment, studies have shown that the use of oral steroid medications to control inflammation in asthma causes weakness of the inspiratory muscles which can impair lung function. [3-6] Prior studies had suggested that pulmonary rehabilitation and inspiratory muscle training may be beneficial in improving functional capacity and reducing dyspnoea, thereby resulting in a reduction in the use of health care services by patients with asthma. [7,8] Evidence suggests that decreased physical activity may play a role in asthma development while aerobic exercises have been known to improve cardiopulmonary endurance, reduce dyspnoea and improve ventilatory capacity.[9, 10] A study carried out by Boyd *et al* [11] and Aweto *et al*[12] showed that moderate intensity aerobic exercise training programme improve asthma control and fitness level without causing asthma deterioration in adult patients with asthma.

Aside from aerobic exercises, studies have shown that lung function can also be improved by respiratory muscle training using incentive spirometry and diaphragmatic resistance training. [1314]

Incentive spirometer (IS) is a portable device whose main purpose is to promote deep, slow inhalation, up to maximal inspiratory capacity, by providing patients with a visual feedback signaling that the desired flow or volume has been reached. It is simple to use and its use results in a prolonged phase of effective inspiration, more controlled flow and greater enthusiasm to practice. [15]There are no known side effects with the use of IS and it is affordable while patients do not require supervision once trained in their use [16]. Incentive spirometry is used to prevent post-operative decrease in lung function following bariatric surgery, prevention of atelectasis following upper-abdominal surgery or after coronary artery bypasses graft surgery and is widely used clinically as an adjunct to chest physiotherapy.

Diaphragmatic resistance training (DRT) also known as inspiratory muscle training (IMT) works by providing a threshold of inspiratory resistance that the patient inhales against to strengthen the diaphragm. This type of training is marked by expansion of the abdomen rather than the chest when breathing. It is considered to be a useful form of complementary and alternative treatment to the pharmacological approach in the management of asthma.[17] The use of DRT is commonly practiced, especially in those patients with cardiopulmonary disease, to improve a variety of factors such as pulmonary function, cardiorespiratory fitness, posture, respiratory muscle length and respiratory muscle strength.[18-21]. Specifically, DRT is essential to patients with asthma since breathing in these patients is of the thoracic type which is associated with decreased chest expansion and chest deformity as a result of a shortened diaphragm, intercostals and accessory muscles.[19] It has also been demonstrated that placing a load on the diaphragm during contraction increases strength in the muscle, causing a meaningful reduction in breathlessness.[22]

Purpose

There is no clear consensus regarding the comparative efficacy of diaphragmatic resistance training and incentive spirometry on the cardiopulmonary parameters of patients with asthma. This study is therefore aimed at comparing the effects of incentive spirometry and diaphragmatic resistance training on selected cardiopulmonary parameters in patients with asthma.

Materials and Methods

Subjects

Fifty (50) consecutively referred patients with asthma from the out-patient respiratory clinic of Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos State, Nigeria were screened for eligibility based on the inclusion and exclusion criteria. Five (5) were excluded from the study. The remaining forty-five (45) were randomly assigned to three (3) groups (A, B and C) using computer generated random number sequence with 15 participants in each group.

Three participants withdrew from the study due to illness, transportation problem and travel respectively. Finally, 42 of them (22 males and 20 females) completed the study. Group A received aerobic exercise and Incentive spirometry, Group B received aerobic exercise and diaphragmatic resistance training and Group C (control group) received only aerobic exercise. The participants were people between the ages of 21 and 65 years diagnosed with asthma by physicians and who had not been on any form of structured exercises in the previous six months ; score $\leq$ 3 on the Rapid Assessment of Physical Activity (RAPA) questionnaire. Also included were participants with uncontrolled asthma with a score of 19 and below according to the Asthma Control Test (ACT). Excluded were participants with asthma who had influenza-like or respiratory infection symptoms 2-3 weeks prior to evaluation, those on asthma medications and participants with other lung diseases.

Prior to the commencement of this study, ethical approval was sought and obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital (LUTH) and Health Research and Ethics Committee of the Lagos State University Teaching Hospital (LASUTH). Written informed consent was also obtained from the participants prior to the commencement of the study.

Materials

Incentive spirometry

Airlife volumetric type IS was used in this study. It is a portable device that encourages the patient, through a visual feedback, to maintain slow sustained inspirations and hence promote lung expansion. Incentive spirometry helps in improving lung function and respiratory muscle strength. [15,23,24]

Spirometry

Contec spirometer SP10 (manufactured in China) was used in this study. It is a handheld calibrated device for measuring pulmonary function tests. It is a battery operated device with a display screen of 128x 48 pixel, measuring 162x49x32mm and weighing 180grams. Spirometry is a method of assessing lung function by measuring the volume of air the patient can expel from the lungs after a maximal inspiration.

It is the most common of the pulmonary function tests (PFTs), measuring lung function, specifically the amount (volume) and/or speed (flow) of air that can be inhaled and exhaled. Spirometry is an important tool used for generating pneumotachographs, which are helpful in assessing conditions such as asthma, pulmonary fibrosis, cystic fibrosis, and chronic obstructive pulmonary disease (COPD). The Pulmonary parameters evaluated included Forced Vital capacity (FVC), forced expiratory volume in the first second (FEV1) and peak expiratory flow rate (PEFR).[25]

Diaphragmatic Resistance Training

POWERbreathe (medic) diaphragmatic resistance trainer (POWERbreathe International Ltd, Warwickshire, UK) was used in this study. It is a hand-held inspiratory muscle trainer offering excellent improvement on breathing and performance. It uses the basic principles of resistance training and significantly improves breathing efficiency. POWERbreathe diaphragmatic resistance trainer uses the principles of resistance training to 'load' the inspiratory muscles, improving their strength, power and endurance. [22]

Bicycle ergometer

This is a stationary bicycle, also known as cycle ergometer. This is a device with saddle, pedals, and some form of handlebars arranged as on a bicycle, but used as exercise equipment rather than transportation. It helps to improve cardiopulmonary endurance.

Asthma control test (ACT)

This is a reliable, valid and practicable instrument for asthma control assessment.[26]. It is a set of five questions designed to help patients with asthma describe how the condition affects them. Each response to the 5 ACT questions has a point value of 1 to 5. ACT is scored by adding up the point values for each response to all five questions. Score point value of 19 and below indicates uncontrolled asthma. [27,28]

Methods

Pre-Intervention Assessment

The nature of the study, effect and benefits were explained to the participants.

Explanation of the procedure and accompanied demonstration of assignments in individual training groups was done. Participants were asked if they had recently taken any medications such as bronchodilators or b-blockers and when they last had a meal (ideal is ≤ 2 hours after meal, as heavy meals can affect performance of the test by causing some restriction).

They were advised not to wear tight or restrictive clothing that could interfere with the test.

All assessments were done with the patient in a sitting position. Pulmonary function parameters; forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC) and peak expiratory flow rate (PEFR) and cardiovascular parameters; systolic blood pressure (SBP) and diastolic blood pressure (DBP) were taken pre-intervention (baseline). Pulmonary parameters were taken by instructing the participants to take the deepest breath they could, and then exhale into the spirometer sensor as hard as possible, for as long as possible, preferably for at least 6 seconds. During the test, soft nose clips were used to prevent air escaping through the nose during exhalation. Disposable filter mouthpieces were also used to prevent the spread of microorganisms. All spirometric assessments were done three times and the best value taken. [29]

The cardiovascular parameters; SBP and DBP Were measured in sitting using a sphygmomanometer and a stethoscope and recorded after the pulmonary function tests were done.

Intervention

The participants completed 6 weeks training at a frequency of 3 times per week and 40 minutes each session. All the participants performed aerobic exercise on the bicycle ergometer at a steady state intensity that achieved 60% of maximum heart rate. Aerobic exercise prescription included 5 minutes warm up (which included arm circles and toe raises), 20 minutes of steady state exercise on the bicycle ergometer and a 5 minutes cool down, thus, a total of 30 minutes per aerobic exercise bout. [11]

Participants in group A were positioned sitting upright with the incentive spirometer held in an upright position. The disposable mouthpiece was placed in their mouth and their lips tightly sealed around it. The participants were instructed to breathe in slowly and as deeply as possible allowing the balls in the device rise. They then held their breath for 3 seconds and removed the device from the mouth, exhaling slowly. They had 5 seconds of rest and repeated the steps nine more times making a total of ten repetitions followed by an additional set, making a total of 20 repetitions of two sets. [24]

For diaphragmatic resistance training (group B), the participants sat upright and held the POWERbreathe by the handle cover with the mouthpiece in the mouth so that the lips covered

the outer shield to make a seal. The participants breathed out as hard as they could and then took a fast forceful breath in through the mouth straightening the back and expanding their chest.

They were instructed to breathe out slowly through the mouth with the device still in the mouth until the lungs were empty, letting the muscles in the chest and shoulders relax. They had 5 seconds of rest and then repeated the steps nine more times making a total of ten repetitions followed by an additional set, making a total of 20 repetitions of two sets. [24]

Post- Intervention Assessment

All assessments were done with the patient in a sitting position. Pulmonary function; FEV1, FVC and PEFR, and cardiovascular parameters; SBP and DBP were taken immediately the participants completed their individual group assignment at the end of the 6th week of study.

Data Analysis

` Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20 (Chicago, II). The result was summarized with descriptive statistics of mean, standard deviation, frequency, percentages, bar chart and pie-chart. Paired t-test was used to determine the effects of each intervention on the selected cardiopulmonary parameters pre- and post-intervention.

Analysis of variance (ANOVA) was used to compare the differences in cardiopulmonary parameters across the three groups post-intervention and post-hoc analysis was used to determine the significant difference between one group and another. Level of significance was set at $p < 0.05$.

Results

The mean age of the participants was 33.24± 14.47 years. At baseline, there was no significant difference in the physical characteristics, pulmonary and cardiovascular variables of the participants in the three groups, which implies that the three groups were homogenous (Table 1).

Table 1: Pre-Intervention Data Showing Homogeneity

Variables	Group A $\bar{X}$±SD	Group B $\bar{X}$±SD	Group C X±SD	F-Value	*p- Value*
Age (years)	38.57± 18.62	31.00± 13.19	30.14± 9.65	1.473	0.242
Height (m)	1.63± 0.09	1.67± 0.08	1.66± 0.09	1.138	0.331
Weight (kg)	71.64± 17.63	73.50± 13.82	79.29± 16.44	0.864	0.429
BMI (kg/m^2)	27.25± 7.61	26.25± 5.06	29.14± 6.78	0.699	0.503
FEV1 (L)	1.39± 0.16	1.30± 0.39	1.29± 0.34	0.404	0.670
FVC (L)	1.92± 0.31	1.70± 0.64	1.76± 0.30	0.887	0.420
PEFR (L)	2.37± 1.03	2.84± 0.93	2.04± 0.85	2.587	0.088
SBP (mmHg)	111.43± 11.67	113.57± 10.82	113.57± 9.29	0.189	0.828
DBP (mmHg)	70.71±8.29	71.43±5.35	70.00±5.55	0.167	0.846

Key

FEV_1= Forced Expiratory Volume in first second
FVC= Forced Vital Capacity
PEFR= Peak Expiratory Flow Rate
SBP= Systolic Blood Pressure
DBP= Diastolic Blood Pressure
Group A= Incentive spirometry group
Group B= Diaphragmatic resistance training group
Group C= Aerobic exercise/Control group

Table 2 shows the changes in the cardiopulmonary variables pre and post-intervention in the three groups. There were significant changes in all the pulmonary parameters ($p<0.05$) of the three groups while there was no significant change in any of the cardiovascular parameters ($p>0.05$) in the three groups.

Table 2: Changes in the cardiopulmonary variables Pre and Post-intervention in the study groups

	FEV_1	**FVC**	**PEFR**	**SBP**	**DBP**
Incentive Spirometry					
Pre Int. $\bar{X}\pm$SD	1.39± 0.16	1.92± 0.31	2.37± 1.03	111.43± 11.67	70.71± 8.29
Post Int. $\bar{X}\pm$SD	2.08± 0.39	2.44± 0.58	5.27±1.71	110.00± 9.61	70.00± 7.84
t-value	-8.509	-2.908	-7.613	0.806	1.000
p-value	0.001*	0.012*	0.001*	0.435	0.336
Diaphragmatic Resistance					
Pre Int. $\bar{X}\pm$SD	1.30± 0.39	1.70± 0.64	2.84± 0.93	113.57± 10.82	71.43± 5.35
Post Int. $\bar{X}\pm$SD	2.40± 0.43	2.87± 0.60	6.13± 1.89	111.43± 9.49	70.71± 7.30
t-value	-7.977	-5.423	-5.659	1.883	0.563
p-value	0.001*	0.001*	0.001*	0.082	0.583
Aerobic Exercise					
Pre Int. $\bar{X}\pm$SD	1.29± 0.34	1.76± 0.30	2.04± 0.85	113.57± 9.29	70.00± 5.55
Post Int. $\bar{X}\pm$SD	2.00± 0.28	2.44± 0.58	4.33± 1.51	112.86± 9.94	71.43± 6.63
t-value	-6.313	-5.314	-4.316	1.000	-1.000
p-value	0.001*	0.001*	0.001*	0.336	0.336

Table 3 shows the comparison of the mean values of cardiopulmonary parameters across the three Groups (A, B & C) at post intervention (6th week) using ANOVA. Significant difference was observed for FEV1 and PEFR were (*p=0.016* and *p=0.030* respectively) while no significant differences existed in FVC and the cardiovascular variables (SBP and DBP) (p= 0.100, p= 0.739, p= 0.874 respectively).

Table 3: Comparison of the Cardiopulmonary Parameters across the Three Groups Post-Intervention (6th Week**)**

Variables	Group A $\bar{X}\pm$SD	Group B $\bar{X}\pm$SD	Group C $\bar{X}\pm$SD	F-value	*p- value*
Pulmonary Variables					
FEV1 (L)	2.08± 0.39	2.40± 0.43	2.00± 0.28	4.589	0.016*
FVC (L)	2.44± 0.58	2.87± 0.60	2.44± 0.58	2.439	0.100
PEFR (L)	5.27± 1.71	6.13± 1.89	4.33± 1.51	3.839	0.030*
Cardiovascular Variables					
SBP (mmHg)	110.00± 9.61	111.43± 9.49	112.86± 9.94	0.305	0.739
DBP(mmHg)	70.00± 7.84	70.71± 7.30	71.43± 6.63	0.135	0.874

*Significant at p<0.05

KEY

$FEV_{1=}$ Forced Expiratory Volume in first second
FVC= Forced Vital Capacity
PEFR= Peak Expiratory Flow Rate
SBP= Systolic Blood Pressure
DBP= Diastolic Blood Pressure
Group A= Incentive spirometry group
Group B= Diaphragmatic resistance training group
Group C= Aerobic exercise/Control group

On post hoc analysis (least significant difference (LSD), the significant difference observed in FEV1 was found between Groups B&C and A&B. Furthermore, the significant difference observed in PEFR was found between Group B&C.

Table 4: Post Hoc Analysis of the Pulmonary Variables between the Groups

Variables	Group Status (I)	Group Status (J)	Mean Diff (I-J)	P-Value
FEV1 (L)	Group C	Group A	-0.07671	0.589
		Group B	-0.40143	0.007*
	Group A	Group C	0.07671	0.589
		Group B	-0.32471	0.026*
	Group B	Group C	-0.40143	0.007*
		Group A	0.32471	0.026*
PEFR (L)	Group C	Group A	-0.93071	0.158
		Group B	-1.79143	0.009*
	Group A	Group C	0.93071	0.158
		Group B	-0.86071	0.191
	Group B	Group C	1.79143	0.009*
		Group A	0.86071	0.191

*Significant at $p<0.05$

KEY

$FEV_{1=}$ Forced Expiratory Volume in first second
PEFR= Peak Expiratory Flow Rate
Group A= Incentive spirometry
Group B= Diaphragmatic Resistance Training
Group C= Aerobic exercise/ Control

Discussion

The purpose of this study was to compare the effects of incentive spirometry and diaphragmatic resistance training on selected cardiopulmonary parameters in patients with asthma.

The homogeneity of the pre-intervention parameters across the three groups indicates that the results of this study could not have been influenced by any confounding variables of the subjects, or by chance or external factors.

The significant effect of incentive spirometry on pulmonary parameters in this study is in line with previous studies which concluded that there was an improvement in asthma control and quality of life for patients with asthma in addition to a significant difference in maximal respiratory pressures, spirometric variables and oxygen saturation in patients who underwent incentive spirometry after coronary artery bypass grafting. [30] These effects may be due to the fact that it is a form of low-level resistance training that emphasizes sustained maximal inspiration and reduces the resistance to airflow by increasing lung volume, improving deep breathing, expanding collapsed areas in the lungs and preventing alveolar collapse.[31,32] The fact that there was no significant effect of incentive spirometry on cardiovascular parameters in patients with asthma corroborates findings of Basoglu *et al* [33]which reported that incentive spirometry acts majorly on the pulmonary function.

The post-intervention improvement in aerobic exercise (control) group in this study could be due to the fact that aerobic exercises produce a training effect which improves ventilatory functions and increases the capacity to utilize oxygen. Aerobic exercise therefore not only improves the respiratory system but also many other systems which in turn improve the respiratory system. [13,34] This finding is thus a confirmation of previous studies that aerobic exercise could improve pulmonary functions in patients with asthma. Prior studies had also reported that exercise performance improves pulmonary function in patient with chronic obstructive pulmonary disease due to respiratory muscle endurance training. [35,36]

Findings from this study revealed that diaphragmatic resistance training improved pulmonary parameters in patients with asthma. Diaphragmatic resistance training has a higher-level resistive effect than incentive spirometry thus resulting in a strengthening of the respiratory muscles. Strengthened respiratory muscles will likely reduce the perception of breathlessness which consequently will reduce the possibility of exercise-induced asthma. This is consistent with the report of prior studies which showed a reduction in dyspnoea and an increase in the mechanical efficiency of the respiratory muscles with the use of diaphragmatic resistance training.[19,37] In addition, the improvement seen with the use of diaphragmatic resistance training

may be due to an increased expansion and mobility of the chest and aeration of collapsed alveoli, thereby allowing collateral ventilation to occur.

The fact that there were significant differences in pulmonary parameters across the three groups post-intervention implies that incentive spirometry, diaphragmatic resistance training and aerobic exercise had impact in improving FEV1 and PEFR. [19,37] Though incentive spirometry and aerobic exercise improved pulmonary parameters, the possible role of diaphragmatic resistance training in augmenting these effects could be seen in the post hoc analysis which shows significant differences between this group and both the groups that had incentive spirometry and aerobic exercise (control) in improving FEV1 and PEFR. Thus, group B (diaphragmatic resistance training + aerobic exercise group) had better improvement than the single-mode training in the control group.

This nonetheless, suggests synergy rather than interference between diaphragmatic resistance training and aerobic exercise, hence, this mode of training might be useful as an adjunct therapy in patients with asthma. [38] These findings are at variance with the study by Silva et al,[39] which showed no significant differences between the diaphragmatic resistance training group and the control group for FEV1 and PEFR and thus attributed their results to inconclusive evidence to support or refute diaphragmatic resistance training. Results from our study however suggest that diaphragmatic resistance training was most effective in improving the pulmonary parameters.

Conclusion

Findings from this study, suggest that the use of incentive spirometry and diaphragmatic resistance training have beneficial effects in improving the selected pulmonary parameters (FEV1, FVC, PEFR). However, the use of diaphragmatic resistance training is clinically more beneficial in the management of asthma. Diaphragmatic resistance training is thus recommended to be part of the intervention in the management of patients with asthma.

Conflict of Interest

The authors report no conflicting interest; financial or otherwise

References

[1].Zhang X, Khol J (2010). A complex role for complement in allergic asthma. *Experimental review of clinical immunology* 6(2): 269-77.

[2]. Onyedum CC, Ukwaja KN, Desalu OO, Ezeudo C (2013). Challenges in the Management of Bronchial Asthma among Adults in Nigeria: A Systematic Review. *Annals in Medical Health Sciences Research* 3(3): 324-329.

[3]. Bassler D, Mitra AAD, Ducharme FM, Foster J, Schwarzer G (2010). Ketotifen alone or as additional medication for long term control of asthma and wheeze in children. *Cochrane database of systematic Reviews.* Issue 7.

[4].Ram FS, Robinson SM, Black PN (2000). Physical effects of training in asthma: a systematic review. *British journal of sports medicine* 34(3): 162-167.

[5].Walsh L, Wong C, Oborne J, Cooper S, Lewis S, Pringle M, Hubbard R, Tattersfield A (2001). Adverse effects of oral corticosteroids in relation to dose in patients with lung disease. Thorax 56(4): 279–284.

[6]. Borba A, Guil D, Naveso G (2006). Oral steroids effects on the respiratory muscles function in severe asthmatic patients. *Rev Port Pneumol* 12(6):39-40.

[7]. Turner LA, Mickleborough TD, McConnell AK, Stager JM, Tecklenburg-Lund S, Lindley MR (2011). Effects of inspiratory muscle training on exercise tolerance in asthmatic individuals. *Medicine and science in sports and exercise* 43(11): 2031-8.

[8]. Ochmann U, Kotschy-Lang N Raab W, Kellberger J, Nowak D, Jorres RA (2012). Long-

term efficacy of pulmonary rehabilitation in patients with occupational respiratory diseases. *Respiration* 84(5): 396-405.

[9].Lucas SR, Platts-Mills TA (2005). Physical activity and exercise in asthma: relevance to etiology and treatment. *J Allergy Clin Immunol*. 2005 May;115(5):928-34.

[10]. Hallstrand TS, Bates PW, Schoene RB (2000). Aerobic conditioning in mild asthma decreases the hyperpnea of exercise and improves exercise and ventilatory capacity. *Chest*. 118 (5), 1460-1469.

[11]. Boyd A, Yang CT, Estell K, Gerald LB.(2012). Feasibility of exercising adults with asthma: a randomnized pilot study. *Allergy, Asthma and Clinical Immunology* .8(1):13

[12]. Asthma Aweto, H.A., Akodu, A.K., Adedara, A.C., Olawale, O.A. (2015). A Comparative Study of the Effects of Aerobic and Resisted Exercises on Selected Cardiopulmonary Parameters in Patients with AJPARS Vol. 7, Nos. 1 & 2 pp. 52 -60

[13]. Farid R, Azad FJ, Atri AE, Rahimi MB, Khaledan A, Talaei-Khoei M, Ghafari J, Ghasemi R (2005). Effect of aerobic exercise training on pulmonary function and tolerance of activity in asthmatic patients. Iran J Allergy Asthma Immunol. 4(3):133-138.

[14]. Alaparthi GK, Augustine AJ, Anand R, Ajith M (2013). Comparison of flow and volume oriented incentive spirometry on lung function and diaphragm movement after laparoscopic abdominal surgery: a randomized clinical pilot trial. International journal of physiotherapy and research 1(5): 274-278.

[15].Hough A (2001). Physiotherapy in respiratory care (3rd ed). Cheltenham. Uk: Nelson Thornes

[16]. Westwook K, Griffin M, Roberts K, Williams M, Young K, Digger T (2007). Incentive spirometry decreases respiratory complications following major abdominal surgrery. *Surgeon* 5(6): 339-342.

[17].Vinay M, Arati M, Shobhana P (2014). Inspiratory Muscle Training using Deep Breathing Exercises and Incentive Spirometer on Lung Function in Immediate Post-Partum Mothers. Indian *Journal of Physiotherapy and Occupational Therapy* 8(2): 38-42.

[18]. Shaw I, Shaw BS, Brown GA (2010). Role of Diaphragmatic Breathing and Aerobic Exercise in Improving Maximal Oxygen Consumption in Asthmatics. *Science & Sports* 25: 139-145.

[19]. Shaw BS, Shaw I (2011). Pulmonary function and abdominal and thoracic kinematic changes following aerobic and inspiratory resistive diaphragmatic breathing training in asthmatics. *Lung* 189(2): 131-139.

[20]. Shaw BS, Shaw I, Brown GA (2013). Concurrent aerobic and resistive breathing training improves respiratory muscle length and spirometry in asthmatics. *African Journal for Physical, Health Education, Recreation and Dance* 180-193.

[21]. Shaw I, Shaw BS (2014). The effect of breathing and aerobic training on manual volitional respiratory muscle strength and function in moderate, persistent asthmatics. *African Journal for Physical, Health Education, Recreation and Dance* 2: 45-61.

[22]. Lotters F, Tol B, Kwakkel G, Gosselink R (2002). Effects of controlled inspiratory muscle training in patients with COPD: a meta-analysis. *European respiratory Journal* 20: 570-76.

[23]. Davis SP (2012). Incentive spirometry after abdominal surgery. *Nursing Times* 108(6): 22-23.

[24]. Paiva DN, Assman LB, Bordin DF, Gass R, Jost RT, Bernardo-Filho M, Franca RA, Cardoso DM (2015). Inspiratory muscle training with threshold or incentive spirometry: which is the most effective? *Revista Portugesa de Pneumologia* 21: 76-81.

[25]. Barnes TA, Fromer L (2011). Spirometry use: detection of chronic obstructive pulmonary disease in the primary care setting. Clinical interventions in aging 6: 47-52.

[26]. El Hasnaoui A, Martin J, Salhi H, Doble A (2009). Validation of the Asthma Control Test questionnaire in a North African population. Respir Med. 103 Suppl 2:S30-37. doi: 10.1016/S0954-6111(09)70025-3.

[27]. Nathan RA, Sorkness CA, Kosinski M, et al. Development of the asthma control test: a survey for assessing asthma control. *J Allergy Clin Immunol* 2004;113:59–63

[28]. Jumbo Johnbull, Adewole Olanisun Olufemi and Erhabor Gregory Efosa. (2013). Comparison of Asthma Control Test (ACT) and Global Initiative for Asthma (GINA) in the Assessment of Asthma Control and Usefulness of Act in a Resource Poor Setting. *Greener Journal of Medical Sciences* ISSN: 2276-7797 Vol. 3 (2), pp. 065-070.

[29]. Awopeju OF, Erhabor GE, Balogun MO, Obaseki DO, Erhabor FA, Adewole OO (2011). Exercise-induced asthma in adult Nigerian asthma patients: a comparison of step test, free running and bicycle ergometer. *African journal of respiratory medicine* 7(1):

[30] . Rondinel TZ, Corrêa IF, Hoscheidt LM, Bueno MH, Silva LM, Reppold CT, Dal Lago PJ. (2014). Incentive spirometry combined with expiratory positive airway pressure improves asthma control and quality of life in asthma: a randomised controlled trial. *Asthma* 2:1-7.

[31]. Scirica CV, Celedón JC (2007). Genetics of asthma: potential implications for reducing asthma disparities. *Chest*. 132(5 Suppl):770S-781S.

[32]. Overend TJ, Anderson CM, Lucy SD, Bhatia C, Jonsson BI, Timmermans C (2001). The effect of incentive spirometry on postoperative pulmonary complications: a systematic review. Chest. 120(3):971-8.

[33]. Basoglu OK, Atasever A, Bacakoglu F (2005). The efficacy of incentive spirometry in patients with COPD. *Respirology*.10(3):349-53.

[34]. Gomieiro LT, Nascimento A, Tanno LK, Agondi R, Kalil J, Giavina-Bianchi P (2011). Respiratory exercise program for elderly individuals with asthma. *Clinics (Sao Paulo)*. 66(7):1163–1169

[35]. Mendes FA, Gonçalves RC, Nunes MP, Saraiva-Romanholo BM, Cukier A, Stelmach R, et al. (2010) Effects of aerobic training on psychosocial morbidity and symptoms in patients with asthma: a randomized clinical trial. *Chest*;138(2):331-7.

[36]. Avallone KM, McLeish AC (2013). Asthma and aerobic exercise: a review of the empirical literature. *J Asthma*. 50:109–116.

[37]. Lima EVN, Lima WL, Nobre A, Santos AM, Brito LMO, Cost MRSR (2008). Inspiratory muscle training and respiratory exercises in children with asthma. *Journal Brasileiro de pneumologia* 34(8): 552-558.

[38]. Elena Gimeno-Santos, Yogini Raste, Heleen Demeyer, Zafeiris Louvaris, Corina de Jong, Roberto A. Rabinovich et al (2015). The PROactive instruments to measure physical activity in patients with chronic obstructive pulmonary disease. Eur Respir J. Oct; 46(4):988-1000

[39].Silva (2013). Inspiratory muscle training for asthma. *Cochrane Database Systematic Reviews*.

THE CONSEQUENCES OF LACK OF PHYSICAL EXERCISE ON SPINE ALIGNMENT AND BODY WEIGHT IN UNIVERSITY STUDENTS

CONSECINȚELE LIPSEI EXERCIȚIULUI FIZIC ASUPRA ALINIAMENTULUI CORPORAL ȘI ASUPRA GREUTĂȚII LA STUDENȚI

Voinea Andreea[11]

Keywords: spinal disorders, body mass index, physical exercise

Abstract

Introduction: The spine is supposed to have a slight degree of curvature to it so it can absorb the daily stress of movement. If this natural curvature becomes too excessive there is misalignment.

Aim: The aim of the study was to investigate the body posture, the body mass index and the level of physical activity in university students.

Method: The study was conducted on 560 students - 356 females and 204 males, with an age average of 19 years old. From the research methods were used the direct observation, anthropometric measurements and the interview technique. The body mass index will be used in order to determine if a person is underweight, normal weight, overweight or obese.

Result: 30% of students adopt a correct body posture and about 80% of girls and 65% of boys have a weekly organized physical activity only during the physical education classes. The number of lordotic deficiencies is higher for girls and the number of kyphosis deficiencies is higher for boys. 44% females are accusing back pain at least once a week. 207 students (36,96%) have weight problems, 85 students (15,18%) are underweight and 122 students (21,78%) are overweight. 21,34% of females are underweight and 18,8% are overweight. 26,96% males are overweight and 4,41% are underweight.

Conclusion: Students are less interested in movement and sport, spending a lot of time in front of the computer. The study has provided that little or no physical activity is related to the risk of develop a vicious body posture and weight problems.

Cuvinte cheie: tulburari de statică, indice de masa corporală, exercițiu fizic

Rezumat

Introducere: Coloana vertebrală prezintă curburi fiziologice normale necesare absorbției oscilațiilor mecanice datorate mișcării. Dacă aceste curburi sunt accentuate apare lipsa aliniamentului corporal.

Scop: Scopul studiului a fost de a investiga postura corpului, indicele de masă corporală și nivelul de implicare în activitătate fizice sportive la studenți.

Metodă: Studiul a fost realizat pe 560 studenti – 356 de sex feminin, 204 de sex masculine, cu o medie de vârstă de 19 de ani. Metodele de cercetare folosite au fost observația directă, măsurătorile antropometrice si interviul. Pentru a stabili dacă o persoană este subponderală, supraponderală sau obeză se calculează indexul de masă corporală.

Rezultate: 30% dintre studenti adoptă și mențin o postură corporală corectă și 80% din fete și 65% din băieți au activități fizice regulate și organizate doar în cadrul orelor obligatorii de educație fizică. Numărul deficiențelor de tip lordotic este mai crescut în cazul fetelor și cele de tip cifotic în cazul băieților. 44% din fete acuză dureri de spate cel putin o dată pe săptămână. 207 din totalul studenților au probleme de greutate, 85 (15,18%) fiind subponderali și 122 (21,78) fiind supraponderali. 21,34% din studente sunt subponderale, 18,8% sunt supraponderale, 26,96% din studenți sunt supraponderali și 4,41% sunt subponderali.

Concluzii: Studenții sunt din ce în ce mai putin interesați de activitatea fizică și de sport. Studiul a demonstrat că lipsa activității fizice poate conduce la atitudini posturale deficitare și probleme de greutate.

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Introduction

Continue technology of life contributes to avoid physical exercise. Regular physical activity has been proven to help prevent a wide variety of health problems. Influence of practicing systematic physical exercise is visible in the external shape of the body, in its proportional development and in maintaining a proper body weight. The decline of physical activity is considered to play an important role in the deterioration of health predictors and in the outer shape of the body.

„Structural and functional changes of the spine can be caused by something trivial such as a faulty posture. If neglected, it can cause structural changes of the spine, which affects its morphological changes and normal development and inherently leads to strains of various degrees, which in turn drastically affect the long-term functionality of the spine.'' [1].

The anatomically normal developed spine in an adult individual contains four curvatures with a concave base in the sagittal plane, two backward concave curvatures in the cervical and lumbar areas, and two forward concave curvatures in the thoracic and sacral areas. The spine is vertical in the frontal plane. [2]

Spine curvature disorders

„The physiological curvature deviations of the spine from those considered normal finally lead to the onset of physical deficiencies of this axial system which provides the entire attitude of the human body.'' [3]

Scoliosis is a medical condition in which a person's spine has a sideways curve. The curve is usually "S"- or "C"-shaped. In some the degree of curve is stable, while in others it increases over time. Pain is typically not present. Diagnosis is confirmed with plain X-rays. Scoliosis is typically classified as either structural in which the curve is fixed or functional in which the underlying spine is normal. The cause of most cases is unknown but believed to involve a combination of genetic and environmental factors. „Mild scoliosis generally does not cause pain, problems with movement, or difficulty breathing. It may only be diagnosed if it is noticed during a regular physical examination or a scoliosis screening at school. The most common signs of the condition include a tilt or unevenness (asymmetry) in the shoulders, hips, or waist, or having one leg that appears longer than the other. A small percentage of affected children develop more severe, pronounced spinal curvature." [4]

Scoliotic attitude is a simple lateral deflection of the spine, reducible and without rotation of the vertebrae. Column curves of less than 10 degrees are considered normal.

A normal thoracic spine extends from the 1st to the 12th vertebra and should have a slight kyphotic angle, ranging from 20° to 45°. [5] When the "roundness" of the upper spine increases past 45° it is called kyphosis. The cause is not currently known and the condition appears to be multifactorial and is seen more frequently in males than females. „Kyphosis is an extremely common musculoskeletal imbalance brought on by prolonged time in some postural positions, exercise and/or activity choices, environmental factors, myofascial dysfunction and psychological stress."[6]

Kyphosis can occur as a deformity solely in the sagittal plane, or it can occur in association with an abnormality in the coronal plane, resulting in kyphoscoliosis.

Kyphosis attitude is a deviation from the normal of spine that can be autocorrected by awareness of body position and improvement of vicious body posture. The body tendency to adopt a kyphosis position but that can be self-correcting by straightening the back.

The term *lordosis* refers to the normal inward lordotic curvature of the lumbar and cervical regions of the human spine. Lumbar hyperlordosis is a common postural position where the natural curve of the lumbar region of the back is slightly or dramatically accentuated. The lumbar spine should be in 40° to 60° of lordosis. [5] Lordosis is found in all age groups. It primarily affects the lumbar spine, but can occur in the neck (cervical). When found in the lumbar spine, the patient may appear swayback, with the buttocks more prominent, and in general an exaggerated posture. Lumbar lordosis can be painful and sometimes affecting movement.

Kyphosis-lordosis posture is a posture characterized by a convex curvature of the thoracic spine and an inwardly curved lower back resulting from the pelvis being tilted forward.

Lordosis attitude is a deviation from the normal of spine that can be autocorrected by awareness of body position and improvement of vicious body posture. The body tendency to adopt a lordosis position but that can be self-correcting by straightening the back.

,,The patient who suffered a deformation of the spinal column in time comes to acquire some position skills he isn't aware of, just because the interoceptors don't act normally anymore. That's why is necessary a corrective, outer force, for the patient to be aware- step by step, again- of his correct position and to be able to stimulate his adequate mechanisms, which allow him to self-correct.''[7, pg.10]

In order to determine if a person is underweight, normal weight, overweight or obese it's used body mass index. BMI is a person's weight in kilograms divided by the square of height in meters. A high BMI can be an indicator of high body fatness. For adults, BMI is interpreted using standard weight status categories. These categories are the same for men and women of all body types and ages. The standard weight status categories associated with BMI ranges are:

- Underweight <18.50
  - Severe thinness <16.00
  - Moderate thinness 16.00 - 16.99
  - Mild thinness 17.00 - 18.49
- Normal range 18.50 - 24.99
- Overweight ≥25.00
  - Pre-obese 25.00 - 29.99
  - Obese ≥30.00
    - Obese class I 30.00 - 34.99
    - Obese class II 35.00 - 39.99
    - Obese class III≥40.00. [8]

Pourpose: The aim of the study was to investigate the body posture, the body mass index and the level of physical activity in university students. In according with the results it was wanted to be made a paralell between physical activity behaviors and students' vertebral disorders and between physical activity and students' weight problems.

The study wanted to provide that little or no physical exercise is related to the risk of develop a vicious body posture and the lack of physical activity leads to problems related to body weight.

Matherial and Methods

The study was an ascertaining one and it was conducted in April, May, October 2017 in Bucharest Academy of Economic Studies sport halls, on a sample of 560 students, 356 females (63,57%) and 204 males (36,43%), with ages between 18 and 29 years old, average age 19,43 ± 1,31.

The direct observation, anthropometric measurements and the interview technique, were used as assessment means.

In assessing the subjects we used the direct subjective method, the somatoscopic assessment, consisting in the visual examination of the global and segment alignment of the body, from the front, back, and profile, in a static position and in action. The somatoscopic assessment examined the alignment of the shoulders line, the alignment of the pelvic line, the position of the head, shoulders, pelvis, the presence of the gibbosities, the exaggeration of the vertebral curves.

The weight and height of the subjects were determined in the anthropometric measurements, these were used for calculating the body mass index.

The interview had a number of eight questions. Four questions were dichotomous and four questions had multiple answers. The subjects were asked:

1. About their age.
2. If they have/had back pain at least once a week.
3. If they know of the presence of some static vertebral disorders.
4. If they did or do physical therapy.
5. If they have regular and organized physical activities weekly.
6. How many times a week they have physical activities.
7. What kind of sports activities practice.
8. Where do they practice physical exercises.

Results

Table 1 – Results of vertebral disorders and physical activity level

No	*Investigated item*	*Females*	*Percent*	*Males*	*Percent*	*Total*	*Percent*
1	Kyphoscoliosis	7	1,97%	11	5,39%	18	3,21%
2	Kyphosis-lordosis	13	3,65%	0	0%	13	2,32%
3	Kyphosis	22	6,18%	24	11,76%	46	8,21%
4	Kyphosis attitude	46	12,92%	38	18,63%	84	15%
5	Lordosis	32	8,99%	3	1,47%	35	6,25%
6	Lordosis attitude	47	13,20%	8	3,92%	55	9,82%
7	Scoliosis	39	10,95%	15	7,35%	54	9,64%
8	Scoliosis attitude	53	14,89%	28	13,73%	81	14,46%
9	Other disorders	3	0,84%	6	2,94%	9	1,60%
10	Correct posture	94	26.40%	71	34,80%	165	29,46%
11	Static vertebral disorders	262	73,60%	133	65,19%	395	70,53%
12	Vicious attitudes	146	41,02%	74	36,27%	220	39,28%
13	Vicious postures	116	32,58%	59	28,92%	175	31,25%
14	Back pain	158	44,38%	30	14,70%	188	33,57%
15	They knew of static vertebral disorders following medical controls (of total number of those with disorders)	171	65,27%	88	66,17%	259	65.56%
16	They made physical therapy (of those who knew)	42	24,56%	11	12,5%	53	20,46%
17	They do physical therapy.	6	3,50%	0	0%	6	2,31%
18	They never did physical therapy (of those who knew)	129	75,44%	77	87,5%	206	79,53%
19	They practice physical activity 2-3 times a week	61	17,13%	48	23,52%	109	19,46%
20	They practice physical activity 4-7 times a week	18	5,05%	25	12,25%	43	7,67%
21	They practice physical activity only in physical education class	277	77,81%	131	64,22%	408	72,85%
22	They do weight training (of those who do physical activity)	13	16,45%	39	53,42%	52	34,21%
23	Running (of those who practice physical activity)	26	32,91%	6	8,21%	32	21,05%
24	Games (of those who practice physical activity)	2	2,53%	20	27,39%	22	14,47%
25	Gym (of those who practice physical activity)	31	39,24%	0	0%	31	20,39%
26	Dance (of those who practice physical activity)	3	3,80%	1	1,34%	4	2,63%
27	Other sports (of those who practice physical activity)	4	5,06%	7	9,59%	11	7,24%

Table 1 – Results of anthropometric measurements

Statistical		Mean ± std. dev	Min.	Max.
MALES	Height	179,72±6,82	164	197
	Weight	75,47±13,09	48	130
	BMI	23,41±3,42	14,5	37
FEMALES	Height	165,76±6,21	190	150
	Weight	58,09±9,96	36	97
	BMI	21,18±3,64	15,4	37,9
TOTAL	Height	170±9,3	150	197
	Weight	64,42±9,96	36	130
	BMI	21,93±3,69	14,5	37,9

Discussion

The subjects represent the young generation. The females are between 18 and 28 years old with an average of 19.21 years and the standard deviation of 0,93 (1 - 28 years, 3 - 23 years, 7- 21 years, 104 - 20 years, 178- 19 years, 63- 18 years) and the males are between 18 and 29 years old with an average of 19,81 and the standard deviation of 1,33 (1- 29 years, 1 – 25 years, 3 – 24 years, 3 – 23 years, 7 – 22 years, 23 – 21 years, 70 – 20 years, 83 – 19 years, 13 – 18 years).

It is concerning that only 30% of students adopt a correct body posture, although vertebral static disorders cannot be considered secondary to other conditions, only 4 students said it's were secondary (1 crash accident , 1 clavicle fracture, 2 limb differences). Of the total static disorders, 55.70% are vicious attitudes due to a negligent body position and 44.30% are vicious posts. Also worrying it is the lack of concern about static vertebral disorders, only 20.46% of those who knew about column deficiencies did physical therapy and only 2.31% do physical therapy.

The number of lordotic deficiencies is higher for girls - 26% compared to 5.5% for boys. The number of kyphosis deficiencies is higher for boys - 36% compared to girls 20%. In this case we can assume a connection with the fashion of the bulging posterior for the girls and the fashion of the male man (excess of muscle mass and the upper body which is worked hard and incorrectly). 26% of girls and 21% of boys have scoliosis deficiencies. The increased number of scoliotic attitudes may be related to the wearing of the loaded handbag and the backpack on one shoulder.

Alarming is it also the increased number of back pains in girls case, 44% of them are accusing back pain at least once a week. Spinal pain can have a profound effect on a person's overall health, sometimes preventing them from working or even doing simple daily activities. "Spinal disorders are among the most common causes of hospital visits around the world. Most common spinal disorders include low back pain, neck pain scoliosis and disc disease, to name a few. Over 80 per cent of adults will suffer back pain at some point in their lives. 50% of the working population will experience back or neck pain symptoms at least once per year. Age is one of the most common risk factors for spinal pain, and the greatest effects of population ageing are predicted in low- and middle-income countries. Back and neck pain is one of the most common reasons for workplace sick leave," said Dr. Gautam R. Prasad, Spine Surgeon, Paras HMRI Hospital, Patna, at a press conference on the occasion of World Spine Day. [9]

207 students (36,96%) have weight problems, 85 students (15,18%) are underweight and 122 students (21,78%) are overweight. 143 of 356 females student have weight problems (40,17%) - 76 of 356 females student are underweight (21,34% of females) and 67 of 356 females student are overweight (18,8% of them) – 5 females are obese class I and 2 females are obese class II. 64 of 204 males student have weight problems (31,37%). 55 of 204 males are overweight (26,96%) – 10 males are obese class I and 1 male is obese class II and 9 males are underweight (4,41%).

It is noticeable that women have problems of underweight as well as overweight.

Underweight problems are associated with nutritional deficiencies, weakened immune system and fertility problems. The image of the perfect woman created by the media leads to an increased number of underweight women, the abnormality of normal is no longer differentiated.

It is known that the prevalence of overweight and obesity is rising. Excess weight may increase the risk for many health problems, including type 2 diabetes, high blood pressure, heart disease, strokes, certain types of cancer, sleep apnea, osteoarthritis, fatty liver disease, kidney disease and pregnancy problems. Both males and females have overweight problems, but among men, the prevalence of overweight is higher than females. The results of the study are close to the results of a 2014 study in which 22% students were overweight or obese (24.7% men and 19.3% women). [10]

Physical inactivity is one of the most important public health problems of the 21st century, and may even be the most important. Students said they do not have time for physical activity, about 80% of girls and 65% of boys have a physical activity organized weekly only during the physical education classes. The sedentary lifestyle adopted due to lack of time is an alarm signal. Motivation due to lack of time it considered to be not justified as it follows ,,a study conducted on 460 students has concluded that:

• 63% spend more than 6 hours in front of a computer;
• 96% spend 1-3 hours daily on the Internet;
• 94% consider surfing the internet a method of relaxation" [11]

The question is what will motivate them to do physical activity after the second year of study, when the physical education classes will be no longer compulsory,. ,,Research on the value of sports exercises as prophylactic means is as numerous as those in the therapeutic field - for recovery. We know that health education, in the prophylactic sense, is not just a medical task; it must be achieved through a comprehensive influence" [12]

Lack of physical activity can be linked to static vertebral disorders and weight problems. Hypotonia of paravertebral muscles results in the lack of correct body alignment. ,,These bad habits are caused largely by sedentary life, characteristic of contemporary society and the activities we have learned since childhood, such as writing, which requires intense neuromuscular effort lead to adoption of very tense positions."[14] Physical inactivity is a health risk behaviour which leads to weight problems. ,,Adults should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity. For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity''. [14]

Conclussion

The reasons for the occurrence of these conditions in such a large proportion can be related to the following:

- Students are less interested in movement and sport, spending a lot of time in front of the computer.
- Most students practice physical exercise only once a week only during physical education class.
- The study has provided that little or no physical activity is related to the risk of develop a vicious body posture.
- Spinal disorders and back pains can have a profound effect on a person's overall health, sometimes preventing them from working or even doing simple daily activities.
- Physical inactivity is a health risk behaviour which leads to weight problems.

References

[1] MIHĂILĂ Roxana (2013) *Pilot Study On Monitoring Static And Dynamic Vertebral Disorders In Children Of School Age* in Revista De Cercetare Şi Intervenţie Socială, 2013, tom. 43, pp. 100-114, www.rcis.ro, www.doaj.org

[2] NETER, F. H. (2010). *Atlas of Human Anatomy*. 5th Edition, Newark, Profesional Publisher.

[3] BURCEA Claudia (2010) *The Role Of Physical Therapy In Balancing The Scoliotic Spine,* in Revista Română De Kinetoterapie, tom. 25/ 2010, pp. 45-51

[4] Genetics Home Reference (?) Adolescent idiopathic scoliosis https://ghr.nlm.nih.gov/condition/adolescent-idiopathic-scoliosis

[5] CAVANILLES-WALKER J.M., BALLESTERO C., IBORRA M., UBIERNA M.T.,TOMASI S.O. (2014). *Adult Spinal Deformity*: Sagittal Imbalance in International Journal of Orthopaedics

[6] PRICE, J. (2015) *Excessive Thoracic Kyphosis: More Than Just Bad Posture*, on www.ideafit.com/fitness-library, https://www.ideafit.com/fitness-library/excessive-thoracic-kyphosis-much-more-than-just-bad-posture-0

[7] CACIULAN Elena, STANCA Daniela, MARIN Dana (2011) *Study On The Fed Method Application In Thoraco-Lumbar Scoliosis* in Revista Română De Kinetoterapie, tom. 17/ nr. 28/ 2011, pp.10-18

[8] World Health Organization 2006 *BMI classification* http://apps.who.int/bmi/index.jsp?introPage=intro_3.html

[9] Vinodviplav (2016) *Spinal disorders can be caused by posture, excessive weight and lack of physical activity* on healthspectrum.org , http://healthspectrum.org/spinal-disorders

[10] PELTZER, K., PENGPID S., T. SAMUELS, A., ÖZCAN,N. MANTILLA, C., RAHAMEFY,O., H., WONG, M., L., Gasparishvili, A.(2014) *Prevalence of Overweight/Obesity and Its Associated Factors among University Students from 22 Countries* in International Journal of Environmental Research and Public Health, 11(7), july 2014, pp: 7425–7441, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4113885/

11] VOINEA Andreea (2016*) Impact of excessive computer use on global health state,* in Marathon, tom 8, Nr.2, 2016, pg 273-278

[12] DOMINTEANU Teodora (2010) *Adaptarea Înotului În Terapia Deficienţelor Fizice*, publicată in: Sesiunea internaţională de comunicări ştiinţifice: "PROMOVAREA SPORTULUI ŞI EDUCAŢIEI FIZICE CA PARTE INTEGRANTĂ ÎN FORMAREA TINERILOR", April 23th 2010, Bucharest, Romania. pp. 316-319

[13] SMÎDU NELUTA (2008) *Alexander Method-A Way to use kinesthesia in order to become conscious of our body* , The International Communication Session "European News and Trends in Physical Education and Sports" ASE Bucharest

[14] World Health Organization (2010) *Global Recommendations on Physical Activity for Health.,* Geneva, www.ncbi.nlm.nih.gov/books/NBK305058/

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SEDENTARINESS AS A PREDICTOR OF PREMATURE VASCULAR AGING IN THE CURRENT YOUNG GENERATION

SEDENTARISMUL CA PREDICTOR AL ÎMBĂTRÂNIRII VASCULARE PREMATURE LA TINERII GENERAȚIEI ACTUALE

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Keywords: physical training, sedentariness, hemodynamic parameters, vascular ageing, aortic pulse wave velocity.

Cuvinte cheie: antrenament fizic, sedentarism, parametrii hemodinamici, vârsta, viteza undei pulsatile din aortă.

Abstract

Background. The modern society that has become increasingly technological generates by itself impairments regarding human health, especially for the young people who replace an active lifestyle with a sedentary one.

Purpose: The study aims to demonstrate the negative impact of sedentary lifestyle for young people on the blood vessels, as a predictor of premature vascular ageing and an early development of the disease.

Methods: The study comprise: a group of athletes (S=35) and a group of young non-athletes (T=41). In comparing the two groups were analyzed the hemodynamic parameters: the systolic (SBP),the diastolic blood pressure (DBP), the mean arterial pressure (MAP), the pulse pressure (PP) and the aortic pulse wave velocity (PWVao), all of them correlated with age and heart rate (HR).

Results: The values of the hemodynamic parameters obtained were: group S with a mean age of 40.7 years vs group T 29.1 years (p=0.015); SBP: group S 112.5mmHg vs group T 139.5mmHg (p <0.001); DBP: group S 67.1 mmHg vs group T 83.9 mmHg (p <0.001); MAP: group S 82.5 mmHg vs group T 102.4 mmHg (p <0.001); PP: group S 46.1 mmHg vs group T 55.4 mmHg (p=0.008); PWVao: group S 5.9 m/s vs group T 8.5 m/s (p <0.001); HR: group S 65.3 beats/min vs group T 68.2 beats/min (p=0.047).

Conclusions: The study clearly demonstrated, that physical exercises performed regularly, significantly influence the elasticity of the blood vessels, validated through a far better hemodynamic parameters in the group of athletes.

Rezumat

Introducere. Societatea actuală din ce în ce mai tehnologizată generează după sine şi costuri în ceea ce priveşte sănătatea oamenilor şi în mod special ale tinerilor care înlocuiesc un stil de viaţă activ cu unul sedentar.

Scop: Studiul şi-a propus să demonstreze influenţa negativă a lipsei de mişcare a tinerilor, asupra vaselor de sânge, ca factor predictor al îmbatranirii premature şi a instalării timpurii a bolilor morbide ale societăţii.

Material şi metodă: În studiu au fost inclusi un lot de de sportivi (S) cu o medie de vârsta de 40.7 ani (*n*=35) şi un lot de tineri nesportivi (T) cu o medie de vârstă de 29.1ani (*n*=41). In compararea celor două loturi au fost urmăriţi parametrii hemodinamici (tensiunea sistolică (SBP), diastolică (DBP), medie (MAP), presiunea pulsului (PP), velocitatea unei pulsatile aortice (PWVao), corelaţi cu vârsta şi frecvenţa cardiacă (HR). Indicii hemodinamici urmăriţi în studiu au fost analizati cu ajutorul aparatului TensioMed *Arteriograf*.

Rezultate: Valorile medii ale parametrii hemodinamici obţinuti în urma studiului au fost: lotul de *sportivi* cu o valoare medie de vârsta de 40.7 ani: SBP: 112.5mmHg, DBP: 67.1 mmHg, MAP 82.5 mmHg, PP 46.1 mmHg, PWVao 5.9 m/s,HR 65.3 bătăi/min. Lotul de *tineri nesportivi*, cu o medie de vârstă de 29.1ani: SBP: 139.5mmHg, DBP: 83.9 mmHg, MAP 102.4 mmHg, PP 55.4 mmHg, PWVao 8.5 m/s, HR 68.2 bătăi/min.

Concluzii: Studiul a demonstrat clar că exercitiile fizice efectuate în mod regulat influenţează considerabil elasticitatea vaselor de sânge, lucru validat prin parametrii hemodinamici mult mai buni la lotul de sportive decat la tinerii nesportivi..

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Background

The current modern society that is becoming more and more technologized generates costs regarding human health and especially young people who replace an active lifestyle with a sedentary one.

The inactive lifestyle, the lack of physical training, they all have negative consequences regarding the damage done to the vascular wall structure, resulting in early structural changes that generate the loss of vascular elasticity and thus the appearance of blood pressure. [1,2,3] The loss of vascular elasticity is a vascular wall stiffening phenomenon that operates in a "boomerang" system type: the loss of vascular elasticity leads to arterial hypertension which acts in a negative way further emphasizing arterial wall stiffness. [4,5,6]

This context is structured around the idea that movement and especially physical training act as a delay factor of the complex arterial stiffening phenomenon, becoming a prevention and also a therapeutic method for cardiovascular morbidity. The lack of physical training or sedentariness is considered by some authors an important predictor of cardiovascular mortality, independent of other risk factors . [7,8]

Purpose

The study aims to demonstrate the negative impact of sedentary lifestyle for young people on the blood vessels, as a predictor of premature vascular ageing and an early development of the disease

Material and method

Objectives

- Educating young people for an active lifestyle, even one that involves sport;
- Improving the physical qualities through constant training,
- Improving the hemodynamic parameters and through this, the regression of vascular aging and preventing its early apparition

Subjects and Procedure

The study included a group of athletes (S) with an average age of 40.7 years (n=35) and a group of young people (T) with an average age of 29.1 years (n = 41). The inclusion in the study was done only after a freely given consent by each participant in the study, with respect for individual rights.

We used the Arteriograph, that offers us information about blood function by analyzing the pulse wave and by measuring the arterial stiffness. All the patients were tested dressed in dorsal position, by applying the sleeve at about the same level on the right arm of each study participant. The patients are not allowed to talk, gesticulate or sleep during the measurement. Before the evaluation, the patients had to comply with some standard rules related to sleeping, eating, smoking, alcohol. [9,10]

The Statistical analysis was performed using the Microsoft Office XP Excel and SPSS v.17 programmes. For the numerical variables we have calculated the central tendency and dispersion indicators and presented them as histograms and line graphs; the differences between the independent variables were analyzed using the ANOVA test followed by the parametric significance t-unpaired test. The differences between the variables originating from the same patients were analyzed using the t-paired test. To refine the comparisons between the two groups the post-hoc Scheffe test was applied. [11]

Results

In the comparison of the two groups we followed the hemodynamic parameters, the systolic blood pressure (SBP), the diastolic blood pressure (DBP), the mean arterial pressure (MAP), the pulse pressure (PP), the pulse wave velocity (PWVao) correlated with age and heart rate (HR), weight, height and BMI. The hemodynamic indices followed in the study were analyzed using the TensioMed arteriography device.

Table 1. Age

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
Age	SPORT	35	40.7	17.70	2.99	0.015
	YOUNG	41	29.1	14.50	2.26	

As it can be seen in the table 1, the values regarding age are significantly higher at the SPORT group compared to the YOUNG group with 11.6 years ($p=0.015$, $\alpha=0.05$).

Table 2. Height

Variable	Group	N	Average value	$p^{semnif.}$
Height	SPORT	35	170	0.31
	YOUNG	41	163	

The values regarding height in table 2 are not statistic significant between the two groups.

Table 3. Weight

Variable	Group	N	Average value	$p^{semnif.}$
Weight	SPORT	35	67,68	0.02
	YOUNG	41	66	

We have obtained no significant result regarding the weight, both of the group have an average value of 67 kg.

Table 4. The aortic pulse wave velocity (PWVao)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
PWVao	SPORT	35	5.9	0.42	0.07	<0.001
	YOUNG	41	8.5	1.83	0.29	

A difference can be seen regarding the average values of the PWVao,(Table2)_ values that are significantly higher at the YOUNG group compared to the SPORT group with 2.6 m/s ($p<0.001$, $\alpha=0.001$).

Table 5. The systolic blood pressure (SBP)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
SBP	SPORT	35	112.5	6.58	1.11	<0.001
	YOUNG	41	139.3	23.80	3.72	

The SBP values are significantly higher at the YOUNG group compared to the SPORT group with 26.8 mmHg ($p<0.001$, $\alpha=0.001$).

Table 6. The diastolic blood pressure (DBP)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
DBP	SPORT	35	67.1	7.02	1.19	<0.001
	YOUNG	41	83.9	14.67	2.29	

As we can see from table 4, the DBP values are significantly higher at the YOUNG group compared to the SPORT group with 16.8 mmHg. ($p<0.001$, $\alpha=0.001$).

Table 7. The mean arterial pressure (MAP)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
MAP	SPORT	35	82.5	6.98	1.18	<0.001
	YOUNG	41	102.4	16.73	2.61	

The MAP values are significantly higher at the YOUNG group compared to the SPORT group with 19.9 mmHg ($p<0.001$, $\alpha=0.001$)

Table 8. The pulse pressure (PP)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
PP	SPORT	35	46.1	5.64	0.95	0.008
	YOUNG	41	55.4	15.14	2.36	

As we can see from the table 6 , the PP values are significantly higher at the YOUNG group compared to the SPORT group with 9,3 mmHg ($p=0.008$, $\alpha=0.01$)

Table 9. The heart rate (HR)

Variable	Group	N	Average value	Std. Deviation	Std. Error	$p^{semnif.}$
HR	SPORT	35	65.3	9.36	1.58	0.047
	YOUNG	41	68.2	11.80	1.84	

The heart rate values are significantly lower at the SPORT group compared to the YOUNG group with 2.9 beats/minute ($p=0.047$, $\alpha=0.05$).

Discussion

Regarding the FC (pulse), the age parameter influences the group of young people even if they don't have a lifestyle which involves sport. I think it would have been an interesting comparison at this parameter between 2 middle aged groups that are relatively close.

I wish to point out that during the measurement, none of the subjects where under any medication and that the cardiac and vascular differences are in this case due to a stressful and disorderly lifestyle, but physical training prevents the installation of early vascular changes as we can see in the group of athletes and if some changes were already installed, it appears that physical exercise stops the arterial stiffening process provided that it is practiced daily.

The influence of physical training is even more important when it is started at an early age by increasing the optimum operating parameters: respiratory, circulatory , metabolic , etc.

As a prerequisite to the quality of life, health and wellbeing , physical exercise should be included in everyone's lifestyle, preventing the installation of some diseases that could early occur caused by a sedentary lifestyle.

It is believed that, the health of the organism is highly influenced by the quality of the circulatory system, by the quality of blood vessels and this quality is maintained by coordinated physical exercise. A good circulation causes the other functions of the body to function well and the degradation of the circulatory system caused by a sedentary lifestyle involves the dysfunction of various organs that will turn over time into real diseases (such as cardiovascular diseases, chronic kidney diseases, diabetes , etc.)

There is apparent a small difference of 2.6 m/s between the two groups involving PWVao, however is very important from the point of view of vascular elasticity, as the optimum values for this parameter are lower or equal to 7 m/s; the normal values are between 7-9 m/s; high values between 9.7 to 12 m/s and pathological values above 12 m/s. [12,13,14] It can be noticed that the group of young people is approaching the upper limit of normal, although the group is at a relatively early age, demonstrating the enormous effect of physical training on vascular elasticity even at a relatively advanced age.

According to recent studies that have established the normal values of PWV at healthy individuals , the PWV at the group of athletes places them in terms of vascular elasticity at normal values typical to their age of < 30 years. In other words, we talk in metaphorical terms about "a vascular youth" of the athletes whose biological age is almost twice the age of their arteries. [13]

Compared to the group of athletes, the young people included in the study with the PWV values places them at the age level of 50-59 years; so we speak of an early installed "vascular ageing" through lack of physical exercise and probably by associating other factors of sedentary lifestyle. [13]

From a numerical point of view, the TAS parameter compared with the two groups presents higher differences. The difference is even more important as it is observed that the group of young people is approaching the lower limit of grade 1 hypertension according to ESC/ESH guidelines, in which the optimal value is listed at 120 mmHg, 120-129mmHg normal, 130-139 mmHg normal high, 140 -159 mmHg arterial hypertension grade 1. [12] According to the results above, it appears that coordinated physical exercise expresses its beneficial effect by majorly reducing the SBP [12]

Regarding the TAD parameter, the difference of 16.8 mmHg is relatively important given that this parameter is hardly influenced by other factors (diet, medication, etc). In this case, the group of young people is situated around the normal high limit (85-89 mm Hg), which represents something to be concerned about if we take into account the average young age of 29.1 years. [12]

The mean arterial pressure is situated at the same level as the two tension parameters, with significantly lower values compared to the young people group.

Regarding the tension parameters, it was found that the best blood pressure is present at the athlete subjects with the highest degree of training, by comparison, the young people group has a relatively higher value demonstrating the major influence of physical exercise in preventing the appearance of arterial hypertension even at early ages and through this, the co-morbidities associated with this hypertension. [12]

The pulse pressure (PP) is defined as PP= SBP – DBP, is situated regarding the pathology (cardiovascular risk) at values above 60 mmHg, especially if associated with an upper limit of normal or slightly increased TAD (the TAD reflecting the aortic wall damping function degradation) . [12] This parameter shows a slightly apparent oscillation between the two groups: the group of athletes and young people group, but from the point of view of the significance regarding the arterial wall the difference of 9.3 mmHg is distinguishable, taking into account that the PP is a major predictor of cardiovascular events . [15,16,17]

Conclusions

The study demonstrates that the sedentary lifestyle for young people has a negative impact on the blood vessels, as a predictor of premature vascular ageing and an early development of the disease

References

[1] Laogun AA, Gosling RG.(1982) In vivo arterial compliance in man. *Clin Phys Physiol Meas*, 3:201–12.

[2] Mitchell GF, Parise H, Benjamin EJ, et al.(2004) Changes in arterial stiffness and wave reflection with advancing age in healthy men and women: *the Framingham Heart Study*. *Hypertension*, 43:1239–45.

[3] Mitchell GF, Guo CY, Benjamin EJ, et al.(2007) Cross-sectional correlates of increased aortic stiffness in the community: *the Framingham Heart Study*. *Circulation*, 115:2628 – 36.

[4] Laurent S, Cockcroft J, Van BL, et al. (2006) Expert consensus document on arterial stiffness: methodological issues and clinical applications. *Eur Heart J*, 27:2588–605

[5] Laurent S, Boutouyrie P, Asmar R, et al. (2001) Aortic stiffness is an independent predictor of all-cause and cardiovascular mortality in hypertensive patients. *Hypertension*, 37:1236–41.

[6] Baksi et al. (2009) Wave Reflection and Blood Pressure Augmentation November 24, *JACC* Vol. 54, No. 22:2087–92

[7] Warren TY, Barry V, Hooker SP, Sui X, Church TS, Blair SN.(2010) Sedentary behaviors increase risk of cardiovascular disease mortality in men. *Med Sci Sports Exerc,* 42:879–885

[8] Joep Perk et al., (2012) European Guidelines on cardiovascular disease prevention in clinical practice (version 2012), The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in ClinicalPractice, *European Heart Journal,* 33, 1635–1701

[9] Baulmann et al. (2008), Arterial stiffness assessment – a new oscillometric method, *Journal of Hypertension,* Vol 26 No 3, 523-528

[10] Horvath, Cziraki, Papp. (2007); *Intraarterialisan es arteriograffal mert pulzushullam gorbek osszehasonlito vizsgalata; az ESH Milan Meetingen*, a XVII. Europai Hipertonia Kongresszuson bemutatva, Poster Session 31 – Blood pressure measurement

[11] Mihalaş G I, Lungeanu Diana (2009)- *Curs de informatică medicală*. Ed. Victor Babeş, Timişoara,

[12] Mancia G. et.al. (2007) *European Society of Hypertension- European Society of Cardiology guidelines for the management of arterial hypertension*, 28: 1462–1536

[13] *** (2010) The Reference Values for Arterial Stiffness' Collaboration. Eur Heart j. Determinants of pulse wave velocity in healthy people and in the presence of cardiovascular risk factors: establishing normal and references values. *European Heart Journal*, 31: 2338-2350

[13] *** (2002) User procedures of arterial stiffness assessment, Recommendations on general user procedures for clinical studies: standardize the subject condition, AJH–Vol. 15, No. 5

[14] Benetos A, Safar M, Rudnichi A, Smulyan H, Richard JL, Ducimetieere P, Guize L (1997), Pulse pressure: A predictor of longterm cardiovascular mortality in a French male population. *Hypertension* 30: 1410–1415,

[15] Franklin SS, Khan SA, Wong ND, Larson MG, Levy D (1999), Is pulse pressure useful in predicting risk for coronary heart disease? *The Framingham heart study. Circulation* 100: 354–360,

[16] Blacher J, Staessen JA, Girerd X, Gasowski J, Thijs L, Liu L, Wang JG, Fagard RH, Safar ME. (2000), Pulse pressure not mean pressure determines cardiovascular risk in older hypertensive patients. *Arch Intern Med*, 160:1085–1089. MA

ASPECTE PRIVIND INCIDENŢA TRAUMATISMELOR MUSCULO-SCHELETALE LA SPORTIVII DE PERFORMANŢĂ. STUDIU COMPARATIV PE RAMURI SPORTIVE

ASPECTS ON MUSCULO-SKELETAL TRAUMAS IN COMPETITIVE SPORTSMEN. A COMPARATIVE STUDY BETWEEN SPORT BRANCHES

Elena Doina Mircioagă[15]

Key words: sport branches, musculo-skeletal traumas, competitive sportsmen, affected body segment.

Abstract

Aim. The aim of this study is to establish the incidence, frequency and location of musculo-skeletal trauma in the joints at competitive athletes, in a comparison between sport branches, age groups and time spent in training.

Material and method: The study was performed on a batch of 155 sportsmen who practiced athletics, basketball, handball, football and volleyball. The sportsmen were between 13 -42 years old and had been practicing sports for 4-20 years. We recorded and compared the percentage of traumas in the group of athletes, depending on the affected segment, the age groups and the time spent in training, in two periods of time.The study covered three years of competitions, the Z test was applied and considered a significance level $\alpha = 0.05$.

Results. Comparing the percentages between basketball and handball players traumas, we obtained significance for the following segments. Spine, leg, knee, shoulder - traumas in basketball are significantly less ($p=0.014$, $\alpha=0.05$) than in handball. Hand, palm, fist - traumas in basketball ocurring significantly often ($p<0.001$, $\alpha=0.001$) than in handball.

between basketball and volleyball players

Knee and shoulder – traumas in basketball are significantly less ($p<0.001$, $\alpha=0.001$) ($p= 0.003$, $\alpha =0.01$) than in volleyball.

between handball and volleyball players

Hand, palm, fist - traumas in handball are significantly less ($p<0.001$, $\alpha=0.001$) than in volleyball

Conclusions: The performance level and the number of training sessions influenced the high number of traumas that occurred. The extrinsic factors have a strong influence.

Cuvinte cheie: ramuri sportive, traumatisme, sportivi de performantă, segmente afectate.

Rezumat

Scop: Stabilirea incidenţei, frecvenţei şi localizării traumatismelor musculo-scheletale la nivelul articulaţiilor, la sportivii de performanţă, comparativ, între ramuri sporive, pe grupe de varstă şi vechime în sport.

Material si metodă: Studiul a cuprins un lot de 155 de sportivi de performanţă ce practică atletism, baschet, handbal, fotbal, volei. Sportivii au vârste cuprinse între 13-42 de ani, şi o vechime în sport cuprinsă în intervalul 4-20 ani. Am înregistrat şi comparat procentajul traumatismelor sportivilor între ramuri sportive, în funcţie de segmentul afectat, pe grupe de varstă şi vechime în sport pe doua perioade de timp. Studiul s-a derulat pe o perioada de 3 ani competiţionali. S-a aplicat testul Z şi s-a considerat un prag de semnificaţie $\alpha=0,05$.

Rezultate. Comparând procentele traumatismelor între baschetbalişti şi handbalişti, am obţinut semnificaţie pentru următoarele segmente. Coloană vertebrală, gambă, genunchi, umăr, traumatismele fiind semnificativ mai puţine la baschetbalişti ($p=0,014$, $\alpha=0,05$) decât la handbalişti. Mână palmă pumn, traumatismele fiind semnificativ mai multe la baschetbalişti ($p<0,001$, $\alpha=0,001$) decât la handbalişti

între baschetbalişti şi voleibalişti,

- Genunchi, şi umăr traumatismele fiind semnificativ mai puţine la baschetbalişti ($p<0,001$, $\alpha=0,001$) ($p=0,003$, $\alpha=0,01$) decât la voleibalişti.

între handbalişti şi voleibalişti

- Mână-palmă- pumn, traumatismele fiind semnificativ mai puţine la handbalişti ($p<0,001$, $\alpha=0,001$) decât la voleibalişti.

Concluzii: Nivelul de performanţă şi numărul de antrenamente efectuat a influenţat numărul mare de traumatisme înregistrat. Factorii extrinseci au o influenţă mai mare decat cei intrinseci

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Introduction

An injury, irrespective of its cause, may be of critical consequence in a sportsman's life. Hyperfunctional affections are repetitive lesions caused by overstress. They are located at the musculo-skeletal level and affect competitive sportsmen typically. Such lesions occur when a biological tissue (muscle, bone, tendon, ligament etc.) is stressed beyond its physical limits. [1]

The risk of accident is permanent in the competitive sportsman's life and has known ***causes***: too short warm-up periods, faulty training, improper equipment, sport-specific trauma (type of effort, its biomechanical characteristics), aggression on the court, bad courts/grounds, age, years of sports practising, sex, ability, the trainer's pedagogical knowledge and the training methods, the environment and the conditions of training or competitions etc. All this cause variations in trauma incidence percentage, location and type. [2]

Aim

To establish the incidence and location of musculo-skeletal traumas of joints in competitive sportsmen. The study compares different sports, **age groups and longevity in sports practising in two different periods of time, before and after** our intervention in training with specific means (exercise programmes) and injury prevention and rehabilitation methods.

Hypothesis

It's assumed that following the conducted study we can interfere in the training of sportsmen with exercise programmes and specific prevention and rehabilitation methods of sports traumas, according to the following criteria: sport branch, age and gender and sports longevity.

Methods and materials

The study starts from the premise that the high trauma incidence among the studied competitive sportsmen is caused by factors that can be controlled at least partially.

Subjects and Procedure

The study comprised 155 sportsmen (2 female and 103 male) who practiced **track and field (sprint and hurdles), basketball, handball, football and volleyball**. The sportsmen were between 13 and 42 years old and had been practising sports for 4-20 years. The study monitored specific trauma incidence and location, as well as the causes that led to traumas. It covered three competition years, during which the sportsmen were closely monitored.

The statistical processing included:

- the comparison of the average values: the "t" (Student) test was used for pairs of independent batches and a significance (risk) level of 0.005 (5%); the "F" test was used to compare more than two batches (the ANOVA model) [3]
- the regression and statistic correlation: linear regression and the Pearson coefficient;
- the Z test. [4]

- TRAUMA PREVENTION METHODS IN SPORTS THE TRAINING PROGRAMME INCLUDED:

Non-specific exercises for physical fitness
Warm-up exercises typical of every sport
Body strength exercises
Stretching
Post-effort recovery [5]

- METHODS OF RADIO-IMAGERY DIAGNOSIS OF TRAUMAS IN SPORTSMEN:

Radiological examination
CT scan, MRI
Musculo-skeletal ultrasound scans

Results

For a coherent research activity, the studied period of time was separated in two parts:

• The 5 sports were taken into consideration (155 sportsmen (52 female and 103 male). The sportsmen were between 13 and 42 years old and had been practising sports for 4-20 years.

First period

- We contacted the club managers, the coaches, sportsmen, the doctors and the kinetic therapy experts who accompany the sportsmen in competitions.
- The first measurements were taken (anthropometric parameters – height, weight (kg), body mass index (BMI).
- An evidence of trauma incidence, location and number and affected body parts was kept before the exercise programme. The possible method-related mistakes in various moments of training were also recorded.

Second period

- A coherent and complex exercise programme was introduced in the training. It focused on muscle groups and joints that are mostly used in the studied sport games and track and field events.
- The accident causes were determined by adding up the data from the pre-competition examination and tests and from the examination and questioning of the injured sportsmen.
- The sportsmen were monitored both while training and during competitions through different methods (conversation, observation, questionnaires etc). The injured sportsmen were examined imagistically and clinically.

We conducted a prospective-comparative statistical study with the following results:

The comparative (statistical) results of the two studied periods of time:

• The following 5 sports were taken into consideration: basketball, handball, volleyball, track and field and football.

• Traumas were recorded in 11 body parts: forearm, thigh, elbow, spine, face, calf, knee, ankle, hand – palm (PL) fist (FS), foot and shoulder.

• The percentage of trauma and injured sportsmen was compared by sport, sex, age and years of sports practising in the two studied periods.

• The obtained data were compared with the data given in the literature, in an attempt to identify the characteristic of each sport.

Percentage comparisons of traumas in all body parts among the studied sports

The results of the comparisons of trauma percentage by each body part, sport, age groups and years of practising sport in the two periods of time are the following (the Z test was applied and the threshold value $\alpha = 0.05$ was chosen):

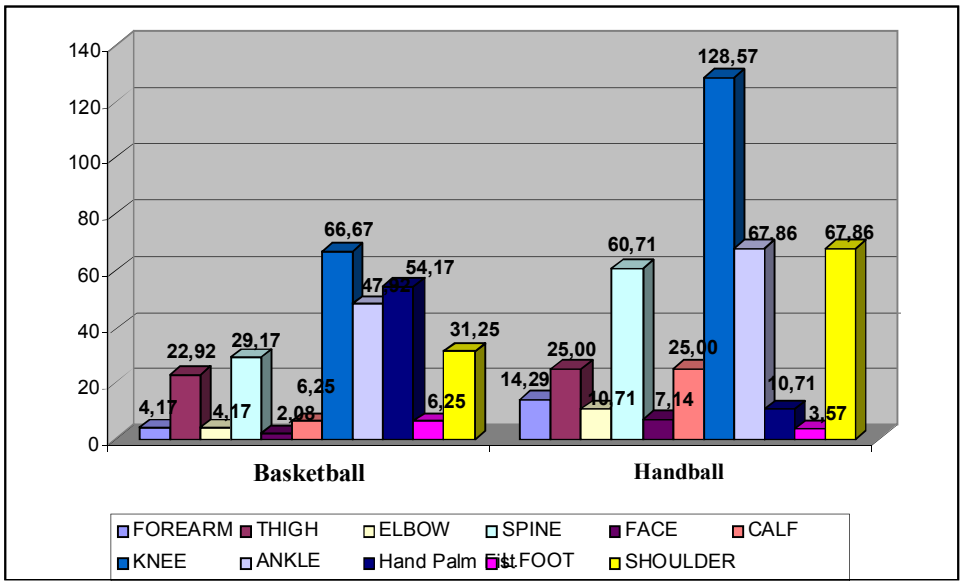


Chart 1 Comparative percentage distribution of traumas by the 11 body parts BASKETBALL–HANDBALL

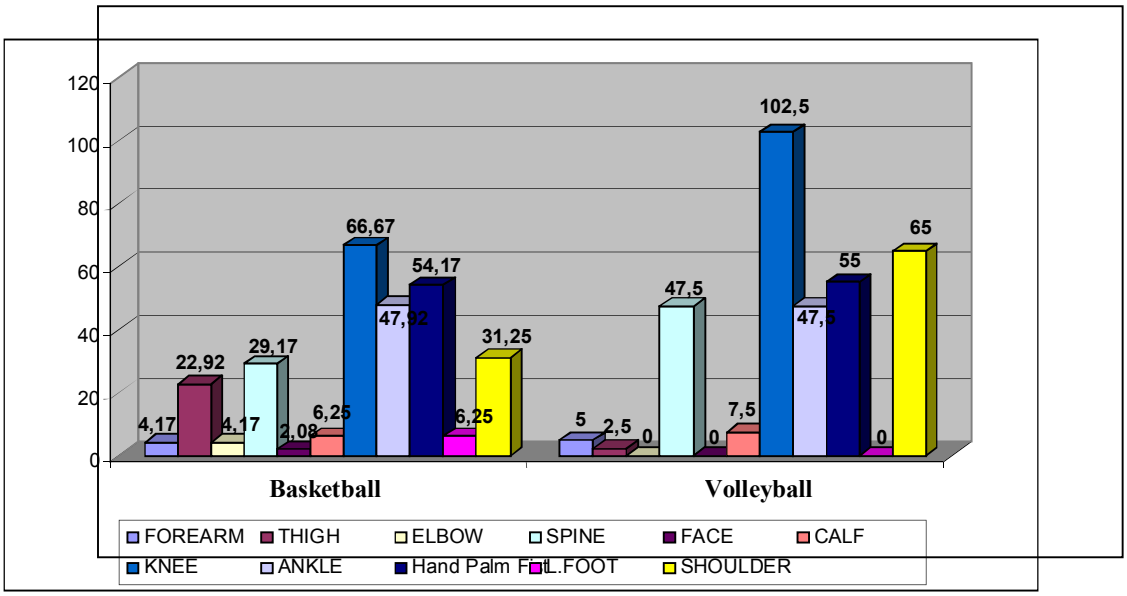
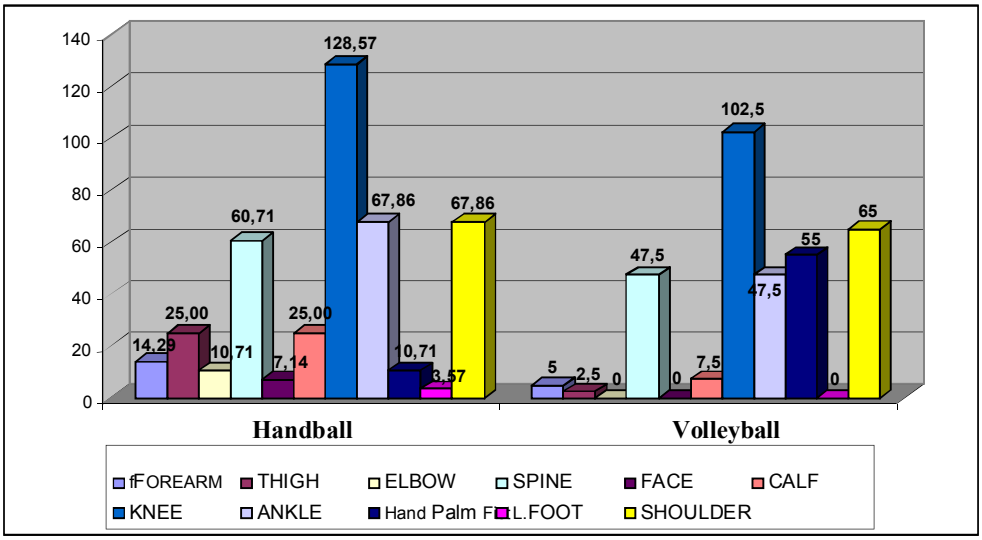


Chart 2 Comparative percentage distribution of traumas by the 11 body parts BASKETBALL – VOLLEYBALL



Graph 3 Chart Comparative percentage distribution of traumas by the 11 body parts HANDBALL – VOLLEYBALL

Table 1. The values given in the table below are the total number of traumas in one body part in relation to the number of portsmen

BODY PARTS	BASKETBALL 48 sportsmen	HANDBALL 28 sportsmen	VOLLEYBALL 40 sportsmen
FOREARM	4.17%	14.29%	5%
THIGH	22.92	25.00	2.5
ELBOW	4.17	10.71	0
SPINE	29.17	60.71	47.5
FACE	2.08	7.14	0
CALF	6.25	25.00	7.5
KNEE	66.67	128.57	102.5
ANKLE	47.92	67.86	47.5
HAND	54.17	10.71	55
FOOT	6.25	3.57	0
SHOULDER	31.25	67.86	65

Table 2. The Z test was used to compare these figures

BODY PARTS	BASKETBALL vs HANDBALL	BASKETBALL vs VOLLEYBALL	HANDBALL vs VOLLEYBALL
FOREARM	0.256 ns	0.743 ns	0.37 ns
THIGH	0.99 ns	0.014 s	0.014 s
ELBOW	0.529 ns	0.56 ns	0.129 ns
SPINE	0.014 s	0.122 ns	0.408 ns
FACE	0.63 ns	0.926 ns	0.324 ns
CALF	0.047 s	0.847 ns	0.097 ns
KNEE	0.002 s	<0.001 s	0.28 ns
ANKLE	0.148 ns	0.861 ns	0.157 ns
HAND	<0.001 s	0.89 ns	<0.001 s
FOOT	0.978 ns	0.308 ns	0.857 ns
SHOULDER	0.004 s	0.003 s	0.99 ns

*On comparing the trauma percentage between the **basketball players** and the **handball players**, the following body parts were significant:*

- **Spine – Calf- Knee – Shoulder, significantly less** traumas in basketball players ($p = 0.014$, $\alpha = 0.05$)
- **Hand palm fist, *significantly more*** traumas in basketball players ($p < 0.001$, $\alpha = 0.001$)

*On comparing the trauma percentage between the **basketball players** and the **volleyball players**, the following body parts were significant:*

- **Thigh – *significantly more*** traumas in basketball players ($p = 0.014$, $\alpha = 0.05$)
- **Knee – Shoulder significantly less** traumas in basketball players ($p < 0.001$, $\alpha = 0.001$)

*On comparing the trauma percentage between the **handball players and the volleyball players,** the following body parts were significant:*

- **Thigh – *significantly more*** traumas in handball players ($p=0,014$, $\alpha=0,05$)
- **Hand palm fist – significantly less** traumas in handball players ($p < 0.001$, $\alpha = 0.001$)

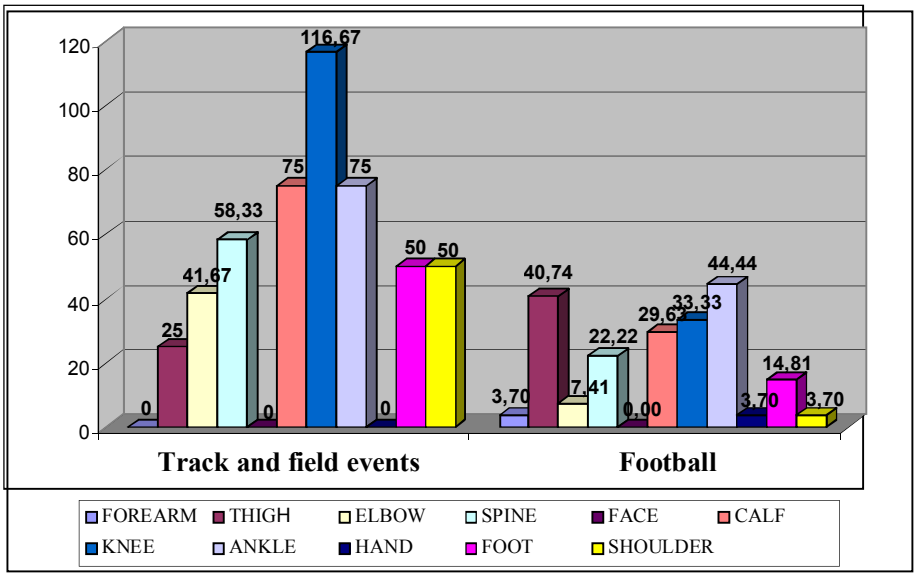


Chart 4. Comparison of trauma distribution in athletes and football players

Table 3. The Z test was used to compare the percentages and the results (p values and significance) are shown in **table 3**.

The comparison between trauma percentages in **athletes** and **football players** had the following significant results:

- elbow – spine -calf – knee- foot – shoulder – significantly less traumas in football players

.

- ***The results of the comparison between trauma percentages by body parts and sport in the two periods are given in the following table (the Z test was applied and the significance threshold was α = 0.05):***

Table 4. Comparisons of the trauma percentages in the two periods p value and significance

BODY SEGMENTS	Athletes vs. football players
FOREARM	0.336 ns
THIGH	0.279 ns
ELBOW	0.016 s
SPINE	0.032 s
FACE	0.99 ns
CALF	0.011 s
KNEE	< 0.001 s
ANKLE	0.078 ns
HAND	0.336 ns
FOOR	0.027 s
SHOULDER	0.002 s

INJURED PARTS	Comparisons of the trauma percentages in the two periods p value and significance				
	ATHLETICS	BASKETBALL	FOOTBALL	HANDBALL	VOLLEYBALL
FOREARM	0.99 ns	0.304 ns	0.5 ns	0.702 ns	0.608 ns
THIGH	0.5 ns	0.085 ns	0.034 s	0.147 ns	0.5 ns
ELBOW	0.079 ns	0.237 ns	0.235 ns	0.665 ns	0.99 ns
SPINE	0.206 ns	0.24 ns	0.233 ns	0.296 ns	0.822 ns
FACE	0.99 ns	0.5 ns	0.99 ns	0.5 ns	0.99 ns
CALF	0.332 ns	0.304 ns	0.262 ns	0.028 s	0.608 ns
KNEE	0.001 s	0.02 s	0.007 s	<0.001 s	<0.001 s
ANKLE	0.107 ns	0.106 ns	0.49 ns	0.016 s	<0.001 s
HAND, PALM, FIST	0.99 ns	0.05 ns	0.5 ns	0.134 ns	0.089 ns
FOOT	0.34 ns	0.304 ns	0.034 s	0.471 ns	0.99 ns
SHOULDER	0.2 ns	0.075 ns	0.49 ns	0.206 ns	0.5 ns

The **red** cases indicate major differences, i.e. the number of traumas decreased significantly in the second period compared to the first, with the **exception** of **foot traumas in football**, whose number **increased significantly (p=0,034 α=0,05).**

In athletics, **knee** traumas decreased significantly (p=0,001 α=0,01).

In basketball, **knee** traumas decreased significantly (p = 0.02, α = 0.05).

In football **thigh** (p = 0.034 α = 0,05) and **knee** (p = 0.007, α = 0.01) traumas decreased significantly; however, foot traumas increased **(p = 0,034, α = 0.05).**

In handball, **calf** (p = 0.028, α = 0.05), **knee** (p < 0.001, α = 0.001) and **ankle** (p = 0.016, α = 0.05) traumas decreased significantly.

In volleyball, **knee** and **ankle** (p < 0.001, α = 0,001) traumas decreased significantly in the second period.

Following the inclusion of prevention exercises and the decrease in the number of trauma-causing factors, trauma incidence was reduced significantly in eight body parts and less significantly in three body parts. [6]

COMPARISONS AMONG SPORTS BY AGE GROUPS

Subjects distribution on age groups, in relation to the practised sport and the total number of traumas in that sport

Table 5. To compare the values, the Z test was used. The results are given in the following table:

Age group	BASKETBALL - HANDBALL	BASKETBALL-VOLLEYBALL	HANDBALL - VOLLEYBALL	ATHLETES - FOOTBALL
13-18	< 0,001 s	0,499 ns	< 0,001 s	< 0,001 s
19-22	0,816 ns	< 0,001 s	0,003 s	0,058 ns
23-26	0,012 s	0,208 ns	0,206 ns	< 0,001 s
27-30	0,29 ns	< 0,001 s	< 0,001 s	-
Over 30	0,583 ns	0,309 ns	0,08 ns	-

- ***The differences between the trauma percentage in the two periods, by sport and age groups, are not* significantly.**

COMPARISONS AMONG SPORTS BY YEARS OF SPORT PRACTISING

*Table 6 ** 1st Period*

Years of sport practicing	BASKETBALL - HANDBALL	BASKETBALL-VOLLEYBALL	HANDBALL - VOLLEYBALL	ATHLETES - FOOTBALL
4-6	0.03 s	0.436 ns	0.002 s	0.139 ns
7-10	0.983 ns	0.157 ns	0.14 ns	0.014 s
11-15	0.176 ns	0.294 ns	0.013 s	0.009 s
16-20	0.887 ns	0.99 ns	0.855 ns	0.029 s
> 20	-	0.022 s	0.032 s	-

The most affected groups are the following:

- 7-10 years (43.87%) and 11-15 years (40%), in all sports

*Table 7 ** 2nd Period*

Years of sport practising	BASKETBALL-HANDBALL	BASKETBALL-VOLLEYBALL	HANDBALL - VOLLEYBALL	ATHLETES - FOOTBALL
4-6	0.748 ns	0.228 ns	0.068 ns	0.037 s
7-10	0.427 ns	0.958 ns	0.366 ns	0.158 ns
11-15	0.462 ns	0.988 ns	0.538 ns	0.015 s
16-20	0.647 ns	0.942 ns	0.948 ns	0.316 ns
> 20	-	0.043 s	0.08 ns	-

The most affected groups are the following:

- 7-10 years (43.87%) and 11-15 years (40%) in all sports.

The comparison of the trauma number by groups of years of sport practising was based on the Z test. The values given in the table below show **significantly differences** between trauma percentages among certain groups. *The comparisons were made within the same period and between the two periods*, to identify the groups with the largest number of injured sportsmen and the largest number of traumas.

- *The differences between the trauma percentage in the two periods, by sport and groups of years of sport practising are irrelevant.*

Comparisons by sport of trauma incidence in the studied batch with data from literature

The Z test was applied to compare trauma incidence in the studied batch with trauma incidence in literature. The results are shown in the following table:

Table 8. Comparisons by sport of trauma incidence in the studied batch with data from literature

Sport	% of injured sportsmen Studied batch	% Literature	p value and significance
Track and field (N_1=12) (N_2=16)	**100**	**73%**	**0.083^{ns}**
Basketball (N_1=48) N_2=123)	**87.5**	**61.3%**	**0.002^{s}**
Football (N_1=27) N_2=29)	**88.89**	**85%**	**0.79 ^{ns}**
Handball (N_1=28)N_2=117)	**88.29**	**67%**	**0.037^{s}**
Volleyball (N_1=40)N_2=111)	**97.5**	**63%**	**<0.001^{s}**

- **N1 – no. of sportsmen in the studied batch**
- **N_2 - no. of sportsmen in literature** [6,7,8]
- The differences between the percentage of injured athletes and football players are insignificant.
- Significantly more traumas occurred in the basketball, handball and volleyball players of our batch than in literature.

Discussions

The joint trauma distribution in the studied batch is the following:
• In the handball and volleyball batch, knee joint lesions are much more frequent than in the basketball batch.
• The repeated overstress of the extensor mechanism as a result of repeated jumping affected 67.5% volleyball players, and 43% of the basketball players. [8]
• Studies have shown that in volleyball the highest rate of traumas is associated with blocking and attacking, as both involve jumping.
• A study performed on 116 trauma-suffering sportsmen from 1997 (in the sportive medicine centre) concluded that over 60% of the injuries were caused by jumps.
• The factors favouring accidents are intrinsic and extrinsic. The latter have a higher influence, (the number of training sessions per week, the volume, not the type of training (plyometrics versus overstress). [8].
• Another factor is the type of court. Tough surfaces like concrete increase trauma risk, while polished hardwood floors reduce the ground reaction force.
• In basketball and handball, the most common injuries are knee and ankle sprains which may also lead to meniscal and muscle lesions.
• As far as pathology is concerned, according to this study, the most frequently affected joints in sportive games are the knee, ankle, shoulder, spine, hand (palm-fist), and the knee, shoulder, thigh and calf in track and field. [6]

• Accidents are less frequent in track and fieldthan in football, as both this study and the data in specialised literature show. According to the latter, most lesions occur in athletes (especially hurdlers).
• Every major or moderate trauma was preceded by a minor injury.

Conclusions

The results of our study have revealed a larger number of traumas in the players than the literature of the field. The high trauma incidence is caused by an association of controllable factors:
- insufficient effort capacity
- hypocalcemia
- kyphosis, lordosis
- improperly treated previous traumas
- errors in the training methods

In competitions, sportsmen are subjected to factors that cause accidents and musculo-skeletal traumas. Such external factors lead to unpredictable accidents. The usefulness, necessity and beneficial effects of the prevention programme included in the sportsmen's training were proved.

The performance level and the number of trainings influenced the large number of recorded traumas.

Traumas caused by overstress had a higher incidence than accidental traumas. They accounted for about 73% of the total number of traumas. [8]

References

[1] Anton, B., Ionescu A., 2004 . *Afecţiuni hiperfuncţionale ale umărului în sportul de performantă.,* Revista Ştiinţa sportului.
[2] Avramescu T., Vasilescu M., Rusu L., Ilona I., Zăvăleanu M .,2006. *Methodological approaches of risk factors in sports traumatology volleyball,* XIV Balkan Sports Medicine Congress, Albena, Bulgaria, abstract book, p.43;
[3] Rinderu ET., Ilinca I., Rusu L., Kesse AM., 2004. *The role of physical conditioning for prevention of sports injuries in a volleyball team.* The 13th Balkan Congress in Sports Medicine, Drama.
[4] Gagea, A.,1999. *Metodologia cercetării ştiinţifice în educaţie fizică şi sport*. Ed. Fundaţiei "România de Mâine". Bucureşti pg., 105-115;.
[5] Mihalaş G I., Lungeanu D., 1998. *Curs de Informatică Medicală*. Timişoara: Ed. Eurobit.
[6] Mircioagă A, Barzuca D.,Mircioagă ED. 2013, " Excess in sport and its consequences – traumas knee injuries", Ovidius University Annals, Series Physical Education and Sport /Science, Movement and Health, Vol. XIII, ISSUE 2 Supplement, pag 649-655,
[7] Mircioagă ED., Mircioagă A.,2010. *„A study on musculoskceletal traumas incidence in competitive sportmen",*– Revista de Medicină Sportivă, Romanian Sport Medicine Society, Vol VI, Nr.4 (24)/..
[8] Mircioagă ED .,2014.*Profilaxia traumatismelor musculo-scheletale la sportivi, Editura Eurostampa,* Colecţia Pantanassa, Timişoara.

EFECTUL ACTIVITĂŢILOR FIZICE PRACTICATE ÎN SĂLI DE FITNESS ASUPRA POSTURII FEMEILOR ADULTE

EFFECTS OF PHYSICAL ACTIVITY PRACTICED IN GYMS ON ADULT WOMEN'S POSTURE

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Key words: body posture, physical deficiencies, adult women, physical activity

Abstract

Aim: The purpose of our study was to evaluate the effects of physical activity practiced in gyms on body posture, body attitude and detection of visible physical deficiencies, postural disorders of adult women.

Subjects and methods: The study involved 95 adult women from Oradea, practiotioners of physical exercises in a fitness center. Period of the study: February 2015 - June 2016. For the posture assessment, the global and segmental somatoscopic exams (and photo images) were performed. The physical activity program consisted of Step - aerobics, Pilates and strength training in the gym, 3 times a week for 60-90 minutes each session, for 12 months. The data obtained were statistically analyzed with the SPSS program.

Results: In the initial global somatoscopic assessment, it was found that 48,4% of the subjects had scoliotic body attitudes, 18,9% lordotic, 13,7% normal body attitude, 6,3% kypho-lordotic, 5,3% kyphotic and lordotic-scoliotic and 1,1% military attitude and kypho-lordo-scoliotic. After participating in the training, the final global somatoscopic assessment shows that 40% of the subjects had scoliotic attitude, 17,9% lordotic, 33,7% normal body attitude, 2,1% kypho-lordotic, 2,1% kyphotic, 3,2% lordo-scoliotic, and 1,1% kypho-lordo-scoliotic.

Conclusions: Applying the physical activity program for 12 months contributed to improvements in global body attitude and posture, the number of people with a normal global postural attitude rising from 13 to 32. In segmental somatoscopic assessment, improvements can be seen in all body segments.

Cuvinte cheie: atitudine corporală, postura, deficienţe fizice, femei adulte, activitate fizică

Rezumat

Scop: Scopul studiului nostru a fost evaluarea efectului activităţilor fizice practicate în săli de fitness asupra atitudinii corporale globale şi depistarea deficienţelor fizice vizibile la femei adulte.

Subiecţi şi metode: La acest studiu au participat 95 de femei adulte din Oradea, practicante ale exerciţiilor fizice într-o sală de fitness. Perioada studiului: februarie 2015 – iunie 2016. Pentru evaluarea posturii s-a efectuat examenul somatoscopic global şi segmentar (şi prin imagini foto). Programul de activitate fizică a constat din antrenamente combinate de Step – aerobic, Pilates şi antrenament de forţă, 3 şedinţe pe săptămâna a 60-90 de minute fiecare şedinţă, timp de 12 luni. Datele obţinute au fost analizate statistic cu programul SPSS.

Rezultate: La evaluarea somatoscopică globală iniţială s-a constatat că 48,4% dintre subiecţi au avut atitudine corporală scoliotică, 18,9% lordotică, 13,7% atitudine corporală normală, 6,3% cifo-lordotică, câte 5,3% cifotică şi lordo-scoliotică şi câte 1,1% atitudine plan-rigidă şi cifo-lordo-scoliotică. După participare la antrenamente, evaluarea somatoscopică globală finală arată că 40% dintre subiecţi au avut atitudine corporală scoliotică, 17,9% lordotică, 33,7% atitudine corporală normală, 2,1% cifo-lordotică, 2,1% cifotică, 3,2% lordo-scoliotică şi 1,1% cifo-lordo-scoliotică.

Concluzii: Aplicarea programului de activitate fizică timp de 12 luni a contribuit la îmbunătăţiri ale atitudinii corporale globale şi ale posturii, numărul persoanelor cu atitudine posturală globală normală crescând de la 13 persoane la 32. La evaluarea somatoscopică segmentară se pot observa îmbunătăţiri la toate segmentele corpului.

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Background

The study of the attitude of the human body has been concerned and continues to concern researchers in different fields, due to the complexity of the issues associated with this concept. Being talking about human, the notion of harmonious development includes, besides the physical component, also the psychic one [1].

According to Rosário [2] the study of human posture is relatively new compared to other areas of medical science. Posture can be altered by certain phychological conditions [3,4]. However, it is not an easy subject to study, mainly because postural assessments are still scientifically inaccurate [4]. Two methods are widely used for such assessments: the study of the projection of the center of gravity with the aid of a force platform; and photography of the standing posture, using both frontal and sagittal planes [4]. Some methods, such as MRI, are expensive, while others, such as X-ray, involve radiation problems [5,6,7].

The explanatory dictionary of the Romanian language in 2009 defines the attitude that:

- ✓ Attire, posture or position of the body
- ✓ How to behave towards an event or aspect of reality [8].

Bratu in 1997 defines body attitude as follows:

„ ... the spatial projection of the body into the most frequently used positions and actions of man in his everyday affairs, but especially in standing, sitting, lying, as well as walking. The attitude of the body is the result of the interaction of several factors, including: the hereditary predispositions manifested by the constitutional type, the type of superior nervous activity, the tonicity of the muscles, the character of the professional and the habitual skills, the individual preoccupations for its formation and maintenance."[9].

Body attitude is a "position of the body and its segments present both in static and during movements, provided by cortical and subcortical motor centers, based on proprioceptive, vestibular, visual and auditory complex information. Body activities contribute to forming a correct attitude" [10].

Due to the fact that the term "attitude" has several meanings, in the literature it tends to be replaced by the term "posture".

Attaining a posture we need:

- passive elements (bones, joints etc),
- active elements (neuro-muscular system).

Deviations from the normality of posture are called physical deficiencies. They are characterized by pathological changes and are primarily produced in the shape and structure of the body and are manifested by slowing growth or by excessive growth, by non-harmonious or disproportionate development, through deviations, deformations or other morphological defects. Deficiencies may be: global or partial; somatic, organic or psychic; light, medium or accentuated [11].

Aim: The purpose of our study was to evaluate the effects of physical activity practiced in gyms on global body posture, body attitude and detection of visible physical deficiencies of adult women.

Hypothesis: Physical activity programs practiced in gyms can have a beneficial effect on global body attitude by improving or correcting it.

Materials and methods

Subjects

This study involved 95 adult women (originally 119), who attended two gyms of Fit4U Fitness Center in Oradea.

Period of the study: February 2015 - June 2016. Baseline assessment were conducted in February-March 2015. The subjects attended the gym for 12 months, and during May-June 2016 were carried out the follow-up evaluations. At the follow-up evaluation participated 95 women of 119, others abandoned/quitted along the way (for various reasons: maternity leave, over 2 weeks of physical inactivity).

The research included only those women who showed interest, accepted the measurements and gave permission that their data to be used in research. So it was non-random sampling, from non probabilistic sample category we used the convenience [12].

Methods

The global and segmental somatoscopic examination was performed.

The segmental somatoscopic examination was performed from the anterior, posterior and lateral view.

We have been following the next issues:

- head and neck position:
  - if they are on the same vertical as the trunk;
  - if there are anterior or lateral inclinations.
- Position of shoulders and upper limbs:
  - the lateral or posterior shoulder inclinations are noted;
- Spine position: the appearance of the curves in all planes
- The position of the hip: if it is laterally tilted, in anteversion/retroversion.
- Lower limb positions: the possibility of varum/valgum knee; plantar vault.

For the storage, objectification and confirmation of the data of the global and segmental somatoscopic examination, the assessment was carried out also by photo images at the posture grid wall, under the same conditions.

The photos obtained in this way were processed on the computer as follows:

- the 3 pictures taken from the 3 views were mounted together;
- a vertical line was drawn in the longitudinal axis;
- it was highlighted what was found in the visual somatoscopic examination (Figure no. 1).

The data obtained were statistically analyzed with the SPSS program (descriptive analysis, frequency).

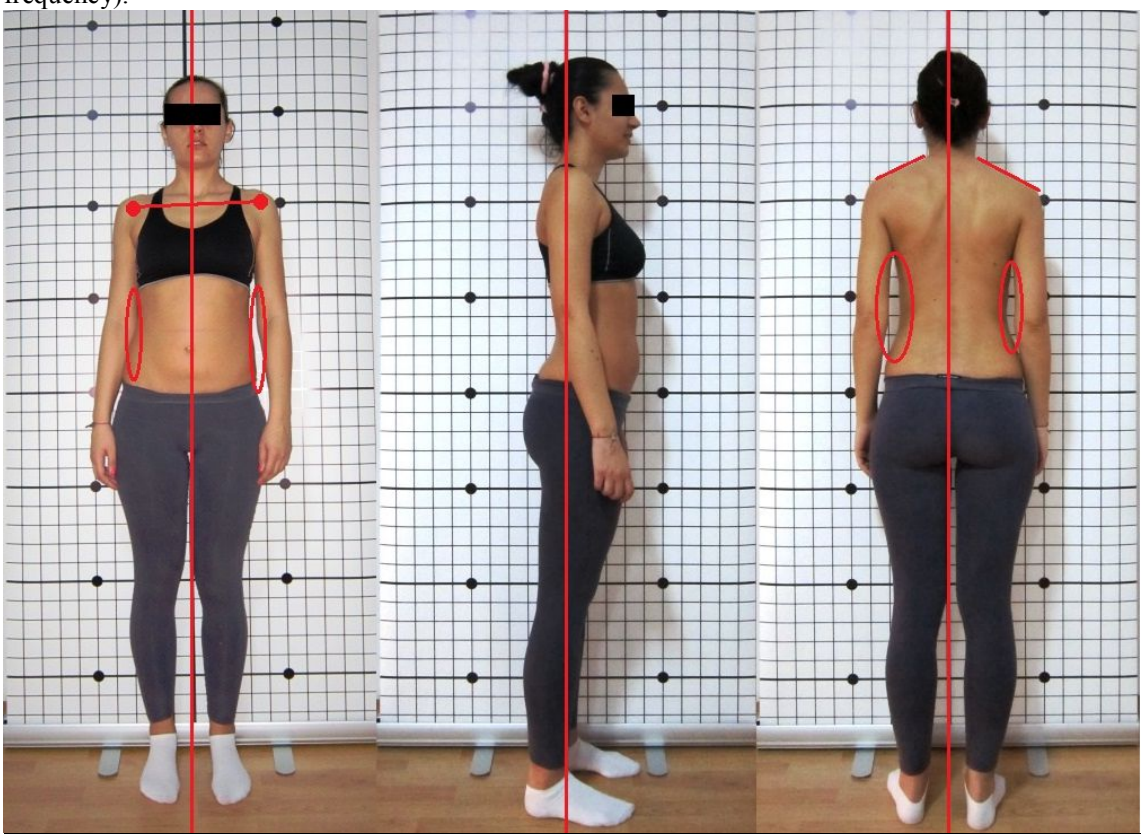


Figure no. 1: Somatoscopic exam by photos

Physical activity program

The physical activity program consisted in combined training of Step - aerobics, Pilates and strength training in the gym, 3 times a week for 60-90 minutes each session, for 12 months.

Depending on individual objectives (correcting the type of attitude) was different the type of the exercises used.

To correct body postures the following types of exercises were used: postural reeducation, stretching, stress relieving of shortened muscles, for increasing range of motion, for the "core" muscles (Pilates).

Muscle strenghtening was conducted mainly in the following muscle groups: transversus abdominis, oblique abdominals, rectus abdominis, paravertebral muscles, pelvic floor muscles, glutes, lower limb and upper limb muscles.

Results

They were assessed 95 adult women, aged between 18 and 52 years. Subjects distribution by age categories are shown in Table no. 1.

Table no.1. Subjects distribution by age categories

	18–24 years	25-34 years	35–44 years	45–54 years	Total 18-54 years
No. of subjects	41	31	14	9	95
Percentage	43,2%	32,6%	14,7%	9,5%	100%

The descriptive analysis of the demographic data of the subjects can be seen in Table no.2.

Table nr. 2. Descriptive analysis of the demographic data of the subjects (N=95)

Demographic data	Assessment	Descriptive analysis		
		Media (±AS)	Min	Max
Age (years)		28,45 (±8,74)	18	52
Height (cm)		166,88 (±6,36)	150	190
Weight (kg)	Baseline	63,67 (±11,69)	43	103
	Follow-up	62,39 (±10,63)	43	98
BMI	Baseline	22,86 (±3,76)	16,61	36,49
	Follow-up	22,40 (±3,60)	16,96	34,72

Were evaluated 95 adult women, of whom at the initial global somatoscopic assessment 46 (48.4%) had a scoliotic body attitude, 18 (18,9%) lordotic, 13 (13,7%) normal body attitude, 6 (6,3%) kypho-lordotic, 5 – 5 (5,3%) kyphotic and lordo-scoliotic and 1 – 1 (1,1%) military attitude and kypho-lordo-scoliotic (Table no.3).

After participating in the training, the final global somatoscopic assessment shows that 38 (40%) of the subjects had scoliotic attitude, 17 (17,9%) lordotic, 32 (33,7%) normal body attitude, 2 (2,1%) kypho-lordotic, 2 (2,1%) kyphotic, 3 (3,2%) lordo-scoliotic, and 1 (1,1%) kypho-lordo-scoliotic (Table no.3).

Table no.3. Prevalence of global postural attitudes at baseline and follow-up assessment (N=95)

GLOBALE POSTURAL ATTITUDE	BASELINE		FOLLOW-UP	
	No. of subjects	Percentage	No. of subjects	Percentage
Normal	13	13,7%	32	33,7%
Lordotic	18	18,9%	17	17,9%
Kyphotic	5	5,3%	2	2,1%
Scoliotic	46	48,4%	38	40%
Kypho-lordotic	6	6,3%	2	2,1%
Lordo-scoliotic	5	5,3%	3	3,2%

Kypho-lordo-scoliotic	1	1,1%	1	1,1%
Military	1	1,1%	-	-
TOTAL	**95**	**100%**	**95**	**100%**

In segmental somatoscopic assessment, before and after the intervention program, head and neck position, shoulder, spine, pelvis and lower limbs were analyzed. We found the following:

1. Head and neck position - initial assessment: 37,9% had a normal position, 48,4% forward head position, 8,4% of the subjects showed the left or right head inclined, 3,2% the head bent forward, 2,1% left or right twisted head. At the final evaluation, 65,3% had a normal head and neck position, 31,6% forward head, and 1,1% inclined head, head bent forward, respectively twisted (Table no. 4).

Table no.4. Head and neck segmental somatoscopic assessment, baseline and follow-up

Head and neck position	BASELINE		FOLLOW-UP	
	No. of subjects	Percentage	No. of subjects	Percentage
Normal	36	37,9%	62	65,3%
Forward head	46	48,4%	30	31,6%
Inclined left/right	8	8,4%	1	1,1%
Bent forward	3	3,2%	1	1,1%
Twisted left/right	2	2,1%	1	1,1%
TOTAL	**95**	**100%**	**95**	**100%**

2. Shoulder position - initial assessment: 23,2% had a normal position, 73,7% had a shoulder higher or lower than the other, 2,1% had rounded shoulders, and 1,1% had a shoulder higher and forward at the same time. At the final evaluation, 51,6% had a symmetrical shoulder position, 46,3% had a shoulder higher or lower than the other, 1,1% had rounded shoulders, respectively a shoulder higher and forward (Table no.5).

Table no.5. Baseline and follow-up segmental somatoscopic assessment of the shoulders

Shoulder position	BASELINE		FOLLOW-UP	
	No. of subjects	Percentage	No. of subjects	Percentage
Normal	22	23,2%	49	51,6%
Higher/lower	70	73,7%	44	46,3%
Rounded	2	2,1%	1	1,1%
Higher and forward	1	1,1%	1	1,1%
TOTAL	**95**	**100%**	**95**	**100%**

3. Vertebral column - initial assessment: 7,4% had no deviation or minor deflection of the spine, 43,2% had a form of scoliosis (in C, S, lumbar, thoracic, dorso-lumbar etc.), 22,1% had lordo-scoliosis, 14,7% lumbar hyperlordosis, 6,3% kypho-lordo-scoliosis, 2,1% kyphosis, respectively military (flat) back with scoliosis and 1,1% kypho-lordosis, respectively kypho-scoliosis. At the final evaluation, 24,2% showed no deflection or minor deflection of the spine, 41,1% had scoliosis, 16,8% lumbar hyperlordosis, 11,6% lordo-scoliosis, 4,2% kypho-lordo-scoliosis, 1,1% kypho-lordosis, respectively kypho-scoliosis (Table no. 6). We have not found any subjects with kyphosis or military (flat) back.

Table no.6.: Baseline and follow-up segmental somatoscopic assessment of the spine

Vertebral column	BASELINE		FOLLOW-UP	
	No. of subjects	Percentage	No. of subjects	Percentage
No/minor deviation	7	7,4%	23	24,2%
Scoliosis	41	43,2%	39	41,1%
Lordo-scoliosis	21	22,1%	11	11,6%
Lumbar hyperlordosis	14	14,7%	16	16,8%

Kypho-lordo-scoliosis	6	6,3%	4	4,2%
Kyphosis	2	2,1%	-	-
Flat back + scoliosis	2	2,1%	-	-
Kypho-lordosis	1	1,1%	1	1,1%
Kypho-scoliosis	1	1,1%	1	1,1%
TOTAL	**95**	**100%**	**95**	**100%**

4. Position of the hip - initial assessment: 32,6% had a normal position, 33,7% had hip anteversion, 14,7% had translated the hip left or right, 13,7% had a combination of anteversion and translation, 3,2% had a lateral tilt of the hip, and 1,1% showed lateral tilt with translation, respectively tilted anteversion. At the final assessment, 48,4% had a normal position, 29,5% had anteversion, 11,6% had translated the hip left or right, 7,4% had a combination of anteversion and translation, and 3,2% had a lateral tilt (Table no.7).

Table no.7.: Baseline and follow-up segmental somatoscopic assessment of the hip

Position of the hip	**BASELINE**		**FOLLOW-UP**	
	No. of subjects	**Percentage**	**No. of subjects**	**Percentage**
Normal	31	32,6%	46	48,4%
Anteversion	32	33,7%	28	29,5%
Translation left/right	14	14,7%	11	11,6%
Anteversion + translation	13	13,7%	7	7,4%
Tilted	3	3,2%	3	3,2%
Translation + tilted	1	1,1%	-	-
Tilted + anteversion	1	1,1%	-	-
TOTAL	**95**	**100%**	**95**	**100%**

5. Lower limbs position - initial assessment: 62,1% had no deviations, 23,2% had genu valgum, 5.3% valgum genu with flat foot, 4,2% had external rotation at one or both legs, 3,2% had a flat foot, 2,1% genus varum. At the final assessment, 78,9% had no deviations at the lower limbs, 14,7% had genu valgum, 3,2% flat foot and 1,1% genu varum, external rotation and genu valg with flat foot (Table no. 8).

Table nr.8.: Baseline and follow-up segmenatal somatoscopic assessment of the lower limbs

Poziţia membrelor inferioare	**BASELINE**		**FOLLOW-UP**	
	No. of subjects	**Percentage**	**No. of subjects**	**Percentage**
Normal	59	62,1%	75	78,9%
Genu valgum	22	23,2%	14	14,7%
Genu varum	2	2,1%	1	1,1%
Flat foot	3	3,2%	3	3,2%
External rotation	4	4,2%	1	1,1%
Genu valgum + flat foot	6	5,3%	1	1,1%
TOTAL	**95**	**100%**	**95**	**100%**

Discussions

At the baseline assessment of global postural attitude only 13,7% of the subjects had a normal posture, in contrast at the final assessment this percentage increased to 33,7%. A study conducted in 2011 by Ferreira and collaborators, with a similar number of subjects (115), in which posture was assessed by anterior, posterior and lateral view of photographs, shows that there is no symmetry in postural alignment and that small asymmetries represent the normative standard for posture in orthostatism [13].

According to McEvoy and Grimmer [14], the literature does not notice a standard approach to evaluate posture. The methodologies used in the study of postural alignments differ [15], and research usually evaluates only one segment, such as head and shoulder position [16,17,18], curvature and length

of thoracic kyphosis and lumbar lordosis [19,20] or the alignment of the spine and pelvis in the lateral view [21], hampering any comparison of the results.

The main tool used to assess posture is visual analysis [22], which can be aided by photos.

In our study, the most frequent postural defficency attitude was scoliotic (48,4% at baseline and 40% at final assessment).

Bogdani et al. [23] in a study analyzing recent literature on the effects of physical activity on posture and postural control, concluded that: in general, there are few studies focusing on the effects of physical activity on postural control and adjustments and also all the studies have enrolled a low number of subject which lead to a necessity for further research with larger groups of subjects and different type of physical activity intervention programs in order to better identify which is the most effective.

At segmental somatoscopic assessment the most common postural disorders were:

- forward head (48,4% at baseline assessment). In the literature, we find similar results: Griegel-Morris et al. [24] found, evaluating a group of 88 healthy volunteers (41 men and 47 women), that 66% of the subjects had the forward head position;
- one shoulder higher or lower than the other (73,7% at baseline assessment); Raine and Twomey [16] pointed out that the right shoulder had a 1° alignment lower than the left shoulder (on 160 asymptomatic subjects, 88 women and 72 males); Ferreira and co-workers [13] confirm the foundings by Raine and Twomey: the right shoulder was lower than the left shoulder, indicating a right tilt in 68% of the sample (115 subjects: 86 women, 29 men);
- scoliosis at the spine (43,2% baseline assessment);
- anteversion of the hip (33,7% baseline assessment);
- genu valgus at lower limbs (23,2% baseline assessment). Numerous studies reflect the valgus alignment of the lower limbs, especially in women [25,26,27].

Conclusions

Applying physical activity programs for 12 months contributed to improvements in global body attitude and improvements in body posture, the number of people with a normal global postural attitude rising from 13 to 32. Also, in segmental somatoscopic assessment, improvements can be seen in all segments of the body. So we can conclude that the hypothesis has been confirmed: physical activity programs have a beneficial effect on global body attitude by improving or correcting it.

Following the study, there were cases of major physical deficiencies, some were unaware of the severity of the deficiencies. They have been referred to a specialist and physiotherapist.

References

[1]. Marcu V, Baştiurea E, Zenovia Stan, Chiuculiţă C. (2008). *Determinarea dezechilibrelor musculare prezente la nivelul trunchiului*. Galaţi: Editura Academica.

[2]. Rosário JLP. (2014) Photographic analysis of human posture: A literature review. *Journal of Bodywork and Movement Therapies*, Volume 18, Issue 1, 56 - 61

[3]. James H, Castaneda L, Miller ME, Findley T. (2009) Rolfing structural integration treatment of cervical spine dysfunction. *J. Bodywork Move. Ther.* 13 (3), 229-238.

[4]. Rosário JLP., Nakashima IY, Rizopoulos K, Kostopoulos D, Marques AP (2012) Improving posture: comparing segmental stretch and muscular chains therapy. *Clin. Chiropractic*. Volume 15, Issues 3–4, December 2012, Pages 121-128

[5]. Suzuki H, Endo K, Mizuochi J, Kobayashi H, Tanaka H, Yamamoto K (2010) Clasped position for measurement of sagittal spinal alignment. *Eur. Spine J.* 19, 782-786.

[6]. Berthonnaud E, Dimnet J, Hilmi R (2009) Classification of pelvic and spinal postural patterns in upright position. Specific cases of scoliotic patients. *Comput. Med. Imaging Graphics* 33(8), 634-643.

[7]. Steffen JS, Obeid I, Aurouer N, Hauger O, Vital JM, Dubousset J, Skalli W (2010) 3D postural balance with regard to gravity line: an evaluation in the transversal plane on 93 patients and 23 asymptomatic volunteers. *Eur. Spine J.* 19, 760-767.

[8]. Academia Română, Institutul de Lingvistică „Iorgu Iordan". (2009). *Dicţionarul explicativ al limbii române (ediţia a II-a revăzută şi adăugită)*. Editura Univers Enciclopedic Gold

[9]. Bratu I, (1977) – *Gimnastica pentru prevenirea şi corectarea deficienţelor fizice*, Editura Sport-Turism, Bucureşti

[10]. Nicu A (coord). (2002). *Enciclopedia educaţiei fizice şi sportului în România*. Editura Aramis, Bucureşti
[11]. Şerbescu Carmen (2011) Kinetoterapia deficienţelor fizice – note de curs
[12]. Şandor SD (2013) *Metode şi tehnici de cercetare în ştiinţele sociale*. Bucureşti: Tritonic.
[13]. Ferreira EA, Duarte M, Maldonado EP, Bersanetti AA, Marques AP (2011) Quantitative assessment of postural alignment in young adults based on photographs of anterior, posterior, and lateral views. *Journal of Manipulative and Physiological Therapeutics*, http://dx.doi.org/10.1016/j.jmpt.2011.05.018
[14]. McEvoy MP, Grimmer K (2005) Reliability of upright posture measurements in primary school children. *BMC MusculoskeletDisord* 2005;29:6-35.
[15]. Normand MC, Descarreaux M, Harrrison DD, Harrison DE, Perron DL, Ferrantelli JR, Janik TJ (2007) Three dimensional evaluation of posture in standing with the PosturePrint: anintra-and inter-examiner reliability study. *Chiropr Osteopat* 2007;15:15-26.
[16]. Raine S, Twomey LT (1997) Head and shoulder posture variations in 160 asymptomatic women and men. *Arch Phys Med Rehabil* 1997;78:1215-23.
[17]. Aitken A (2008) *Reliability of visual assessment of forward head posture in standing*. Master of Osteopathy, Unitec.
[18]. Carneiro Paula Rossi, Cardoso Bárbara dos Santos, Cunha Caroline Modesto da, & Teles Lídia Cristina da Silva. (2014). Reliability intra-and inter-examiner of the head postural assessment by computerized photogrammetry. *Fisioterapia e Pesquisa*, *21*(1), 34-39. https://dx.doi.org/10.1590/1809-2950/402210114
[19]. Leroux MA, Zabjek K, Simard G, Badeaux J, Coillard C, Rivard CH (2000) A noninvasive anthropometric technique for measuring kyphosis and lordosis: an application for idiopathic scoliosis. *Spine* 25:1689-94.
[20]. Dunleavy K, Mariano H, Wiater T, Goldberg A. (2010) Reliability and minimal detectable change of spinal length and width measurements using the Flexicurve for usual standing posture in healthy young adults. *J Back Musculoskelet Rehabil* 23:209-14.
[21]. Roussouly P, Gollogly S, Berthonnaud E, Dimnet J (2005) Classification of the normal variation in the sagittal alignment of the human lumbar spine and pelvis in the standing position. *Spine* 30:346-53.
[22]. Gangnet N, Pomero V, Dumas R, Skalli W, Vital JM (2003) Variability of the spine and pelvis location with respect to the gravity line: a three-dimensional stereoradiographic study using a force platform. *Surg Radiol Anat*. 25(5-6):424-33
[23]. Bogdani A, Pano G (2016) Physical activity effects on postural adjustments: a review. *Journal of Human Sports and Exercise*. 11. . 10.14198/jhse.2016.11.Proc1.15.
[24]. Griegel-Morris P, Larson K, Mueller-Klaus K, Oatis CA (1992) Incidence of common postural abnormalities in the cervical, shoulder, and thoracic regions and their association with pain in two age groups of healthy subjects. *Phys Ther* 1992; 72:425-31.
[25]. Hsu RW, Himeno S, Coventry MB, Chao EY (1990) Normal axial alignment of the lower extremity and load-bearing distribution at the knee. *Clin Orthop Relat Res*. 1990:215-227.
[26]. Cahuzac JP, Vardon D, Sales de Gauzy J (1995) Development of the clinical tibiofemoral angle in normal adolescents. A study of 427 normal subjects from 10 to 16 years of age. *J Bone Joint Surg Br*.1995; 77:729-732.
[27]. Nguyen AD, Shultz SJ (2007) Sex differences in clinical measures of lower extremity alignment. *J Orthop Sports Phys Ther* 2007; 37:389-98.

ÎNFIINȚAREA COLEGIULUI FIZIOTERAPEUŢILOR BIHOR

Ţicărat Ana-Maria[18]

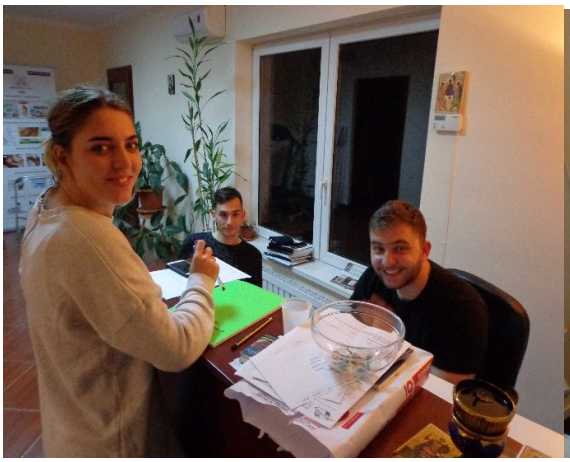
La sfârşitul anului 2017 s-a constituit Colegiul Fizioterapeuţilor din România. În perioada Octombrie-Decembrie 2017 au avut loc alegeri electorale teritoriale şi naţionale. Procesul electoral teritorial s-a desfăşurat în intervalul 5 Octombrie-19 Noiembrie 2017. Primul pas din cadrul procesului electoral a fost constituirea comisiei electorale teritoriale. Membrii comisiei electorale teritoriale au fost desemnaţi de către Comisia Naţională a Colegiului Fizioterapeuţilor. La nivelul judeţului Bihor, comisia electorală teritorială a fost compusă din 5 membri, 2 kinetoterapeuţi, 2 fiziokinetoterapeuţi şi un preşedinte de comisie. Printre membrii comisiei electorale teritoriale Bihor au fost profesor kinetoterapeut ȚICĂRAT ANA-MARIA şi profesor kinetoterapeut OMUȚ ADRIAN. Membrii comisiei electorale teritoriale Bihor au fost sprijiniţi de 4 studenţi - membri supleanţi: LUCACIU DORU, HANȚIU OVIDIU, IUHAS ANTHEEA şi BOCȘE DIANA. Preşedintele comisiei electorale teritoriale Bihor a fost avocat RUSU CRISTIAN.

„O parte din echipa CET BH!”

Perioada pentru înscrierea fizioterapeuţilor pe listele electorale a fost 10 Octombrie-5 Noiembrie 2017. Aceeaşi perioadă a fost şi pentru depunerea candidaturilor pentru membrii Consiliului Teritorial şi pentru reprezentanţii în Adunarea Generală Naţională. La nivelul judeţului Bihor s-au înscris pe listele electorale un număr de 132 de fizioterapeuţi (votanţi), s-au depus 7 candidaturi pentru membru în Consiliul Teritorial şi 4 candiddaturi pentru reprezentant în Adunarea Generală Naţională.

[18] profesor kinetoterapeut, Centrul Școlar pentru Educație Incluzivă *Orizont*, Oradea

Momente surprinse pe parcursul înscrierilor pe listele electorale:



Pregătirea alegerilor electorale:

În data de 12 Noiembrie 2017 a avut loc alegerea membrilor Consiliului Teritorial Bihor şi a reprezentanţilor în Adunarea Generală Naţională.

Momente surprinse pe parcursul alegerilor electorale din Bihor:

Alegerile preşedintelui Colegiului Teritorial al Fizioterapeuţilor din Bihor a avut loc în 19 Noiembrie 2017.



Rezultatele alegerilor pentru Colegiul Fizioterapeuţilor Bihor sunt următoarele:

- Membrii Colegiului Fizioterapeuţilor Bihor sunt:

1. ADAUS DUMITRU – 48 de voturi;
2. BALA GABRIEL – 46 de voturi;
3. CIOBANU DORIANA – 81 de voturi;
4. IOVA NOEMI – 40 de voturi;

5. MADA ADRIAN – 60 de voturi;
6. SERE CRISTINA – 48 de voturi;
7. TARCĂU EMILIAN – 68 de voturi.

- Reprezentanţi ai fizioterapeuţilor din Bihor în Adunarea Generală Naţională sunt:

1. CIOBANU DORIANA – 81 de voturi;
2. MADA ADRIAN – 49 de voturi;
3. TARCĂU EMILIAN – 54 de voturi.

- Preşedintele Colegiului Fizioterapeuţilor Bihor este SERE CRISTINA – 6 voturi.

Procesul electoral a continuat cu alegerea membrilor în Colegiul Naţional al Fizioterapeuţilor din România desfăşurată în data de 10 Decembrie 2017 şi alegerea preşedintelui Colegiului Fizioterapeuţilor din România care a avut loc în data de 17 Decembrie 2017.

Consiliul Național al Colegiului Fizioterapeuților din România este alcătuit din câte 2 reprezentanți pentru fiecare regiune de dezvoltare teritorială, aleși prin vot de către reprezentanții Adunării Generale Naționala. Județele Bihor, Sălaj, Satu Mare, Cluj și Baia Mare fac parte din regiunea de dezvoltare teritorială Nord-Vest și sunt reprezentate în Consiliul Național al Fizioterapeuților de către următorii membrii: CIOBANU DORIANA și MADA ADRIAN.

Preşedintele Colegiului Fizioterapeuţilor din România este doamna CĂCIULAN ELENA.

La final doresc să mulţumesc echipei CET Bihor (Comisia Electorală Teritorială) pentru implicarea şi responsabilitatea de care au dat dovadă pe parcursul procesului electoral și nu în ultimul rând, tuturor profesioniștilor care s-au implicat prin înscrierea pe listele electorale și prin participarea la vot.

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La baza redactării lucrării stau principii deontologice, reguli, norme şi uzanţe etice şi estetice. Pentru realizarea aspectului uniform al revistei şi pentru asigurarea ţinutei ştiinţifice a articolelor, colectivul de redacţie recomandă colaboratorilor revistei să ia în considerare aspectele ce se vor prezenta.

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

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

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

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

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

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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