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POSTURE EVALUATION AND PHYSICAL THERAPY INTERVENTION USING ISOFREE MEDICAL EQUIPMENT, ADAPTED TO DENTISTS – CASE STUDY

POP NICOLAE HORAȚIU[1,*], MOHOLEA ADINA[1], VĂIDĂHĂZAN REMUS[2]

ABSTRACT. Introduction: Dentistry is considered a profession with a high risk of developing musculoskeletal disorders, as a consequence of specific operations involving a high degree of concentration and precision, the whole organism being solicited in a multidirectional manner (Gopinadh et al., 2013). The **objectives** of the study are to evaluate the dentist's posture with the help of IsoFree medical equipment and to develop an intervention program specific to postural disorders, most present in dentistry **Methods:** The research started on the 16th of November 2019 and ended on the 18th of May 2020 and included a case study of one subject. The protocol consisted of ten sessions of evaluation and intervention. The head, cervical and lumbar spine and foot were initially and finally evaluated using photometric measurements and the IsoFree equipment. The physical therapeutic intervention consisted of 19 exercises for each segment evaluated. **Results:** In the cervical spine, the CVA presents an improvement of 5^0 and the cranial angle (CA), has undergone an improvement from 26° to 23°, a decrease of 3^0. In regard to the real time feedback evaluation with the IsoFree, a 5^0 improvement from the initial value of 5^0 was noted after physical therapeutic intervention. In the lumbar spine, the final evaluation on IsoFree reveals a 3^0 progress of the trunk, the final value being -1^0. Using the standardized FPI evaluation, an initial score of +6 has been obtained as well as a final score of +4. In the initial bipodal evaluation with IsoFree, the average CoP X value is 1.88 mm and CoP Y value is 22.47 mm, while in the final evaluation the CoP values on the xOy axis are: 0,53 mm, respectively 13,74 mm. An increase in the values for both parameters of the stabilometry can be observedfrom the initial value of the ellipse surface area of 52.83 mm^2 to 123.55 mm^2, the final value. The perimeter has changed from 311.34 to 525.93 mm^2. **Conclusions:** The evaluation using the IsoFree technology shows significant benefits while being in accordance with other methods of evaluation. The proposed physical therapeutic intervention has determined positive outcomes on the subject's posture.

Keywords: *Posture, Physical Therapy, Technology, IsoFree, Dentistry.*

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REZUMAT. ***Evaluarea posturii și intervenția prin mijloace kinetoterapeutice, adaptată medicului stomatolog cu ajutorul echipamentului medical ISOFREE – studiu de caz.*** **Introducere:** Stomatologia este considerată o profesie cu risc crescut de dezvoltare a leziunilor la nivel musculoscheletal, profesie care solicită multidirecțional întreg organismul, rezultând in adoptarea unor posturi incomode (Gopinadh et al., 2013). **Obiectivele** studiului sunt: să evalueze postura medicului stomatolog cu ajutorul aparaturii medicale IsoFree și să dezvolte un program de intervenție specific deficienţelor posturale, cel mai des întâlnite în cadrul profesiei de stomatolog. **Metode:** Prezentul studiu de caz s-a desfăşurat pe perioada 16.11.2019 – 18.05.2020. Intervenția a presupus 10 şedinţe de evaluare şi intervenţie. Poziția capului, a regiunii cervicale şi lombare a coloanei şi poziția piciorului au fost evaluate inițial şi final, folosind măsurători fotometrice şi echipamentul IsoFree. Protocolul de intervenție kinetoterapeutică a inclus 19 exerciții ce au vizat fiecare dintre regiunile evaluate. **Rezultate:** La nivelul coloanei cervicale, CVA (unghiul craniovertebral) prezintă o îmbunătățire de 5^0 iar unghiul cranian (CA), prezintă o îmbunătățire de la 26° la 23°. În ceea ce privește evaluarea feedback-ului în timp real cu IsoFree, se observă o îmbunătățire de 5^0 după intervenția kinetoterapeutică. La nivelul coloanei lombare, evaluarea finală pe IsoFree relevă un progres de 3^0 al trunchiului. Folosind instrumentul FPI de evaluare a piciorului, a fost obținut un scor inițial de +6, iar scorul final de +4. În evaluarea inițială bipodală cu IsoFree, valoarea medie CoP X este de 1,88 mm și valoarea CoP Y este de 22,47 mm, în timp ce în evaluarea finală valorile CoP pe axa xOy sunt: 0,53 mm, respectiv 13,74 mm. O creştere a valorilor pentru ambii parametri ai stabilometriei poate fi observat. **Concluzii:** Evaluarea cu ajutorul tehnologiei reprezentate de echipamentul IsoFree, prezintă beneficii însemnate și în același timp se află în concordanță cu alte metode observative de evaluare. Intervenția kinetoterapeutică propusă a determinat modificări pozitive în postura subiectului inclus în studiu.

Cuvinte cheie: *Postură, Kinetoterapie, Tehnologie, IsoFree, Stomatologie.*

Introduction

Dentistry is considered a profession with a high risk of developing musculoskeletal disorders, as a consequence of specific operations involving a high degree of concentration and precision, the whole organism being solicited in a multidirectional manner (Gopinadh et al., 2013).

Incorrect postures, most often found during working hours, whether standing or sitting, include a considerable cervical flexion accompanied by lateral flexions and rotations, arm abductions and repetitive movements of the wrist defined by force and precision (Bhandari, Bhandari, Uppal, & Grover, 2013).

When it comes to the lower limbs, often lack of complete ground contact leads to a defective support base. To all of these, the characteristics of static posture are added (Kierklo, Kobus, Jaworska, & Botuliński, 2011).

According to Ruivo et al. (2016, p. 76) „posture can be defined as the relative position of different body parts in space and it is an essential element of normal balance and an important indicator of health".

A variety of methods have been used over time for the posture evaluation: simple or complex, with or without radiations exposure, whether or not specific to an anatomic region. Out of these we mention: goniometry, photography, photogrammetry, radiography or the evaluation using specific medical equipment (Singla, Veqar, & Hussain, 2017).

Objectives

The objectives of the study are:

1. To evaluate the dentist's posture with the help of IsoFree medical equipment
2. To develop an intervention program specific for postural disorders, most present in dentistry

Materials

IsoFree

Fig. 1. IsoFree medical equipment (Tecnobody SRL, 2015)

IsoFree is a medical equipment for evaluation part of the TecnoBody – Functional Line (see Figure 1), for postural and functional training. It has been created for the attainment of physical exercises, whether for recovery or training purposes, with maximum control over one's posture. It contains four main components: stabilometric posture, 3D camera, touch screen and a specialized software, having the aim of analyzing the movement and postural control, giving feedback in real time (Tecnobody SRL, 2015).

Postural control – Stabilometry

According to Horak (2006), the ability of standing vertically, of going or doing different daily activities in a safely manner depends on the interaction of multiple physiological mechanisms resulting in a person's ability of maintaining one's balance. This is accomplished through postural control (Hébert-Losier & Murray, 2020).

The standard examination of postural control is stabilometric testing, which implies the recording of the Centre of Pressure (CoP) in standing position with the help of a pressure platform, i.e. stabilometric platform (Horak, 2006; Ruhe, Fejer, & Walker, 2011).

The stabilometric evaluation using IsoFree is represented by the following parameters: the ellipse surface area and perimeter. The ellipse surface area is determined by the projection of oscillations of CoP on the support base as a result of the postural control process. The perimeter represents the sum of the projected oscillation within the ellipse (Ruhe et al., 2011; Tecnobody SRL, 2015).

Foot alignment

The physiology and anatomic architecture of the foot are known for having an important role, influencing the postural control and the overall posture of the upper structures (Ghasemi, Koohpayehzadeh, Kadkhodaei, & Ehsani, 2016; Wright, Ivanenko, & Gurfinkel, 2012).

Flat foot and cavus foot represent two pathological conditions often found at the level of the foot, which can be a causative factor for different overuse injuries of the inferior limb such as: plantar fasciitis, tibial stress syndrome etc. (Okamura et al., 2020).

FPI-6 (Foot Posture Index - 6 items) is a validated evaluation method of the foot alignment. It has been created as an instrument serving for a comprehensive evaluation of the foot with various uses in clinical practice (Redmond, Crosbie, & Ouvrier, 2006).

Sagittal alignment of the spine

Sagittal alignment implies a harmonious relationship between cervical lordosis, thoracic kyphosis, lumbar lordosis, and pelvic anatomy (Kim & Menger, 2020; Le Huec, Saddiki, Franke, Rigal, & Aunoble, 2011).

Postural deviations of the spine are generated by alteration of regional or global alignment, which implies that any change in a region will result in compensations in adjacent regions. This mechanism, although it is not the most ergonomic, takes place for maintaining the CoP inside the support base (Le Huec et al., 2011).

Hasegawa et al. (2017) proposed a set of average values for the evaluation of spine alignment and the lower limbs in relation to a vertical line through the center of acoustic meati (CAM), on the ground.

At the level of the cervical region, two of the most used photographic measurements with a low degree of error are: the craniovertebral angle (CVA) and the cranial angle (CA) (Sheikhhoseini, Shahrbanian, Sayyadi, & O'Sullivan, 2018). With the help of these measurements the forward head posture (FHP) can be identified. FHP is defined as the excessive sagittal forward positioning of the head andneck in relation to the trunk (Harman, Hubley-Kozey, & Butler, 2005; Sheikhhoseini et al., 2018).

Methods

The research started on the 16th of November 2019 and ended on the 18th of May 2020. The protocol consisted of ten sessions of evaluation and intervention. These took place in the Medical Center Kinetoteam, Cluj-Napoca. The subject included in the study signed an informed consent and the collaboration with the Medical Center Kinetoteam was also realized through aconsent.

The physical therapeutic intervention program was split into four parts:

1. Warm up – fully realized with the continuous feedback on the posture by the IsoFree equipment.
2. Exercises for the cervical region (see table 1)
   (Diab & Moustafa, 2012; Harman et al., 2005; Ruivo et al., 2016; Ruivo, Pezarat-Correia, & Carita, 2017)
3. Exercises for the lumbar region (see table 2)
   (Lewis, Khuu, & Marinko, 2015; Moraes et al., 2009; Slater & Hart, 2017; Yoon, Kang, Kim, & Oh, 2018)
4. Exercises for the foot (see table 3)
   (Kulig, Burnfield, Requejo, Sperry, & Terk, 2004; Mulligan & Cook, 2013; Okamura et al., 2020)

Table 1. Exercises for the cervical region

Exercise	Targeted muscles	Objective
Chin tuck	Deep cervical flexors (Longus colli, Longus capitis)	Strengthening
Standing shoulder pullback	Shoulder retractors (Rhomboids, Middle trapezius)	Strengthening
Prone horizontal abduction with external rotation	Middle and Lower trapezius, Rhomboids, Infraspinatus, Teres minor	Strengthening
Y to I exercise	Middle and Lower trapezius, Serratus anterior	Strengthening
Side lying external rotation	Teres minor, Infraspinatus	Strengthening
Pectoral stretching	Pectoralis muscle	Stretching
Chin drop	Cervical extensors	Stretching
Static SCM stretch	Sternocleidomastoid	Stretching
Static levator scapulae stretch	Levator scapulae	Stretching

Table 2. Exercises for the lumbar region

Exercise	Targeted muscles	Objective
Bridge exercise	Gluteus maximus	Strengthening
Crunch	Rectus abdominis	Strengthening
Plank	Rectus and transversus abdominis, Internal and external oblique	Strengthening
Squat	Gluteus maximus, Quadriceps	Strengthening
Single leg dead lift	Gluteus maximus, Hamstrings	Strengthening
Erector spinae stretching	Erector spinae	Stretching
Gluteal muscles stretching	Gluteus maximus	Stretching

Table 3. Exercises for the foot

Exercise	Targeted muscles	Objective
Short foot	Plantar intrinsic foot muscle	Strengthening
Closed chain resisted foot adduction	Tibialis posterior	Strengthening
Gastrocnemius stretching	Gastrocnemius muscle	Stretching

The data collection within the initial and final evaluation was made using the data registration sheet.

For the evaluation of the head and cervical spine alignment, two standardized measurements have been used: CVA and CA (Ruivo et al., 2016). For the evaluation of the whole sagittal alignment the following have been used: plumb line evaluation (Hasegawa et al., 2017) and the evaluation using the IsoFree medical equipment (Tecnobody SRL, 2015) (see figures 2 and 3). For the foot alignment evaluation the standardized FPI-6 instrument has been used (Okamura et al., 2020).

The physical therapeutic intervention has been conducted for every region according to the recommendations offered by studies with positive results (Lewis & Sahrmann, 2015; Mulligan & Cook, 2013; Okamura et al., 2020; Ruivo et al., 2017; Sheikhhoseini et al., 2018).

Fig. 2 and 3. Evaluation using IsoFree (left) and the screen of IsoFree (right)

Results:

1. The evaluation of the head and cervical spine alignment (see table 4 and chart 1):

Table 4. The results of the CVA and CA evaluation

	Initial evaluation	*Final evaluation*
Craniovertebral angle	51 ^{0}	56 ^{0}
Cranial angle	26 ^{0}	23 ^{0}

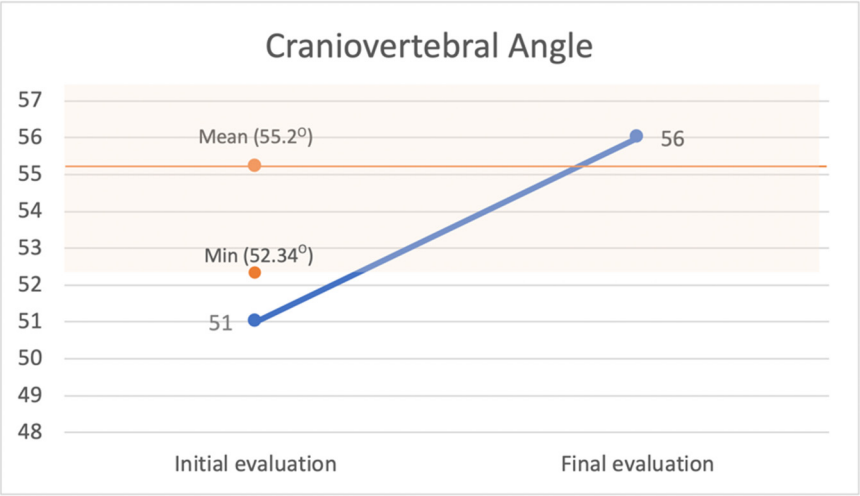


Chart 1. Craniovertebral Angle

2. The evaluation of the sagittal alignment:

Initial observation (see figure 4):

- The acromion is situated behind the vertical line through the center of acoustic meati (CAM), on the ground.
- All the vertebrae remain behind the vertical line through CAM.
- The great trochanter can be observed in the back of the vertical line through CAM.
- The knee and ankle landmarks are situated at the correct side – posterior to the vertical line through CAM, although at a relatively great distance from it.

Final observation:

- The vertebral alignment in relation to the vertical line through CAM can be noticed to distribute on both sides (anteroposterior).
- The great trochanter can be observed in the back of the vertical line through CAM.
- A decreased distance between the vertical line through CAM and the external malleoli can be noticed.
- The distance between landmarks of the lower limb (knee and ankle) and the vertical line through CAM has been diminished, especially in the external malleoli.

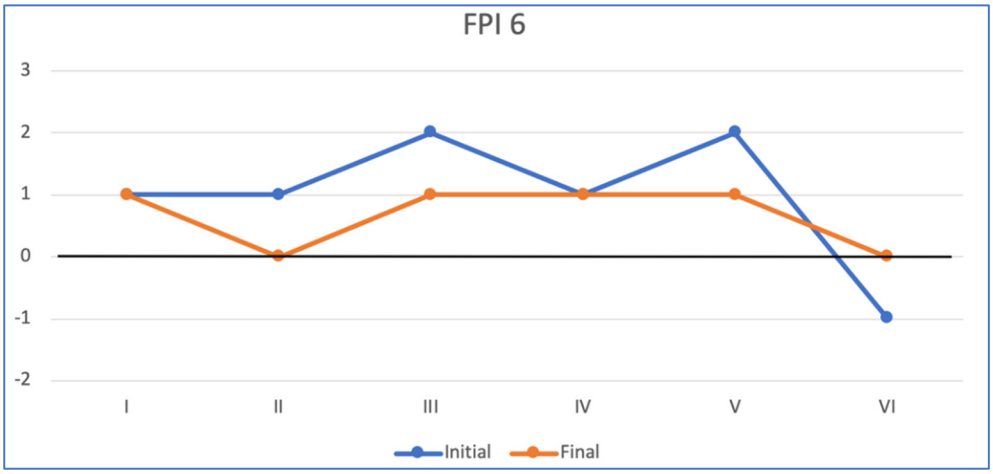
Fig. 4. Initial sagittal alignment using plumb line evaluation
(Photo made by authors)

3. The foot evaluation (see table 5 and chart 2):

Table 5. FPI evaluation results

Items	***Initial inițială***	***Final***
Talar Head Palpation	+1	+1
Supra and infra lateral malleolar curvature	+1	0
Calcaneal frontal plane position	+2	+1
Bulging in the region of talonavicular joint	+1	+1
Height and congruence of the medial longitudinal arch	+2	+1
Abduction/adduction of the forefoot on the rearfoot	-1	0
TOTAL FPI:	**+6**	**+4**

Chart 2. Foot Posture Index 6 items



4. The evaluation with IsoFree (see Table 6 and 7):

Table 6. The results of evaluation using IsoFree– Bipodal evaluation

	Initial evaluation	***Final evaluation***
Ellipse area (mm^2)	52,83	123,55
Perimeter (mm)	311,34	525,93
Average CoP X (mm)	1,88	0,53
Average CoP Y (mm)	22,47	13,74

Table 7. The results of the evaluation using IsoFree – Real time feedback

	Inițial	***Final***
The angle of flexion/ extension of the head	5^0	0^0
The angle of flexion/ extension of the trunk	-4^0	-1^0

Discussions

Cervical spine alignment

In the cervical spine, the CVA presents an improvement of 5^0, from the initial value of 51^0 to the final value of 56^0. CVA offers data on the head position in relation to the neck. Ruivo et al. (2016) and Sheikhhoseini et al. (2018) propose an average CVA value of 55.02° ± 2.86°, and as an inclusion criteria of a patient with forward head posture (FHP) a CVA greater or equal than 50° is suggested. Thus, the patient does not present deviant alignment of FHP, however, it is situated slightly above the inclusion criteria.

The cranial angle (CA), which offers information on the upper cervical vertebrae position, has undergone an improvement from 26° to 23°, a decrease of 3^0. An average value has not been stated, however Mulet, Decker, Look, Lenton, & Schiffman (2007) conclude that a decrease of the CA value represents an improvement, respectively an increase of the value represents a worsening of the condition.

The evaluation of the sagittal alignment with the help of the plumb line, even though it is an accessible method often used, does not offer quantitative data. Kendall, McCreary & Kendall (1983) affirms that CAM must be situated on the same vertical line on the ground, with the external malleoli, although in practice the average distance between the vertical line through CAM and external malleoli, in healthy subjects, is -4,8 cm ± 0,2 cm (the malleoli situated posteriorly) (Hasegawa et al., 2017).

In the case of this study's subject, it can be observed from the sagittal alignment evaluation through the plumb line method, that the external malleoli is situated posteriorly to the vertical line through CAM. The same goes for the acromion. Positive changes of these parameters have been noted after the intervention of physical therapy, however these changes cannot be objectively quantified.

In regard to the real time feedback evaluation with the IsoFree, a 5^0 improvement from the initial value of 5^0, has been noted after physical therapeutic intervention.

The three types of cervical alignment evaluation are in concordance and standardized photometric measurements respectively. CVA and CA, in the initial evaluation show a slightly forward head attitude, but still insufficient for it to be included in the pathologic FHP. In addition, IsoFree confers a relative small initial value of head flexion (5^0), however significant and through sagittal evaluation with plumb line, all of these results can be confirmed according to the criteria offered by Kendall et al. (1983). This concordance among the measurements is also found in the final evaluation.

The alignment of the lumbar spine and the pelvis

In the sagittal evaluation, the alignment has been initially characterized by the retroversion of the pelvis and the swayed back alignment of the trunk, more exactly it can be observed that the pelvis landmark, the great trochanter, is positioned slightly behind the vertical through CAM, which has been modified due to the 5^0 flexion of the head. However, the pelvis landmark must always be in front of the vertical line through CAM (Hasegawa et al., 2017).

The trunk, on the other hand, is situated far more posteriorly to the vertical line through CAM. The entire spine, including the lumbar region, in the case of the studied patient is considerably behind the vertical line, in contrast to the results of Hasegawa et al. (2017), in which the lumbar spine is located in front of the vertical line. The subject's posterior position has been confirmed by the evaluation using IsoFree, which present a value of -4^0 at the trunk, equivalent to 4^0 of extension.

After the intervention of physical therapy, the following improvements in the sagittal evaluation have been noticed: the pelvis is located on the vertical line through CAM, yet this time the line is situated more posteriorly because of the cervical correction. Furthermore, the spine alignment has been improved, while a harmonious anteroposterior distribution of the spine, in relation to the vertical line through CAM was recorded.

The final evaluation on IsoFree reveals a 3^0 progress of the trunk, the final value being -1^0.

The results offered by the IsoFree equipment have also been reflected in the sagittal evaluation, a concordance existing in both the initial and final evaluation.

Foot alignment and Stabilometric evaluation

Using the standardized FPI evaluation, an initial score of +6 has been obtained as well as a final score of +4. The interpretation grid of the obtained results offers the following information: between 0 and 5+, the score represents a neutral foot position; from 6+ to 9+ the foot is in a slight pronation, and from +10 to +12 a pronounced pronation. The negative values represent a slight foot supination, between -1 and -4, and pronounced foot supination from -5 to -12 (Oleksy, Mika, Lukomska-Gorny, & Marchewka, 2010). Therefore, in the initial evaluation, the foot posture is located at the lower bound of slightly supinated posture.

After the physical therapy program, improvements were noticed in four aspects of the FPI evaluation, respectively at the infra- and supra- lateral malleolar curvature, at the calcaneal frontal plane position, at the height of the medial longitudinal arch and the forefoot position.

In the initial bipodal evaluation with IsoFree, the average CoP X value is 1.88 mm, which shows a mediolateral deviation towards the right side. This indicates a slight shift of the weight projection to the right inferior limb. On the Oy axis, the average value is of 22.47 mm. This indicates the anterior projection of the CoP.

After the physical therapy program, an improvement of both directions of the xOy axis is noticed, especially in the anteroposterior plane. During the final evaluation, the average value of the CoP Y is 13,74 mm.

An increase in the values for both parameters of the stabilometry can be observed. From the initial value of the ellipse surface area of 52.83 mm^2 to 123.55 mm^2, the final value. The perimeter has changed from 311.34 to 525.93 mm^2.

These changes, which denote a decrease in the motor control quality and a regress of the stabilometry parameters, have been explained by Ghai, Ghai, & Effenberg (2017), in a meta-analysis on postural stability. They claim that focusing on modifying the spatial positioning of the body, process which is normally automatic, the performance of the motor control can be, temporarily affected.

Conclusions

In the cervical region, three evaluation methods have been used: evaluation using IsoFree, standardized photometric measurements (CVA and CA) and sagittal alignment evaluation using the plumb line. It was noticed that the results of all these methods are in concordance with one another.

The results of the initial cervical alignment evaluation present a slightly forward head position. After the physical therapy, positive results during the final evaluation were obtained.

The alignment of the lumbar spine was evaluated using IsoFree and the plumb line. A deficient extension of the trunk was highlighted, which is ameliorated through intervention.

The foot evaluation with the FPI-6 test was included in this study due to the importance of the ground contact in the superior structure alignment. After the intervention through physical therapy, the slightly supinated position was improved.

Bipodal evaluation using IsoFree reveals improvements of the CoP projection on the support surface following the physical therapeutic intervention. Moreover, the stabilometric evaluation offers indications on the postural control through the following parameters: ellipse surface area and perimeter.

The necessity of including balance and stability exercises in the postural intervention program is suggested by the final results of the stabilometry parameters, which are negatively affected by the conscious focus in an otherwise automated process.

The use of the IsoFree medical equipment brings a number of significant benefits both in evaluation and in intervention. Firstly, it raises awareness on spatial positioning of different segments of the body, giving real time, objective feedback. In addition, it leads to a better understanding of the requirements of the physical therapist as well as the suggested objectives. Another benefit is given by technology in the process of evaluation and rehabilitation which could offer objective, quantifiable and additional data.

The obvious limitations of the study include the small number of subjects which have participated in this program. It is recommended that the protocol be applied to a greater number of subjects in the future.

The evaluation using the IsoFree technology shows significant benefits while being in accordance to other methods of evaluation.

The proposed physical therapeutic intervention has determined positive outcomes on the subject's posture.

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CONSERVATIVE TREATMENT IN CALCIFYING TENDINITIS OF SHOULDER

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ABSTRACT. Introduction: Calcium tendinopathy of the shoulder is a familiar, unpleasant situation distinguished by calcium buildups in rotating tendons. Current assumptions suggest that these calcifications might originate from a cellular-involved procedure in whom, following a calcium sedimentation phase, calcifications are suddenly re-orbited. **Objectives:** This paper aims to establish non-surgical therapeutic conduct of maximum efficiency in the case of calcified Tendinitis in the shoulder by combining methods of physiokinetotherapy. **Methods:** The research methods used by us were: bibliographic method, experimental method, case study method, observation method, test method, statistical-mathematical methods of data processing, graphic method of presentation of results, Shapiro-Wilk test, t-Student test, parametric test for unpaired data, respectively Mann-Whitney test, non-parametric test for unpaired data. **Results:** As a result, statistically, using the t-Student test, $p<0.05$, we found a statistically significant difference between the averages of the abstraction values in weeks 8 and 12 in the two lots. **Conclusions:** Kinetic treatment ensures improvement of the algal component and functional parameters, thus ensuring the patient's quality of life by combating muscle contractions and increasing joint mobility.

Keywords: *Tendinitis, physiokinetotherapy, calcification.*

REZUMAT. ***Tratamentul conservator al tendinitelor calcifiate la nivelul umărului*****. Introducere:** Tendinopatia calcică a umărului este o afecțiune frecventă, dureroasă, caracterizată prin prezența depunerilor de calciu în tendoanele manșetei rotative. Teoriile actuale indică faptul că aceste calcifieri pot fi rezultatul unui proces mediat celular în care, după o etapă de depunere a calciului, calcificările sunt resorbite spontan. **Obiective:** Obiectivul lucrării de față este stabilirea unei conduite terapeutice nechirurgicale de maximă

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eficienţă în cazul tendinitelor calcifiate la umăr, prin combinarea metodelor de fiziokinetoterapie. **Metode:** Metodele de cercetare utilizate de noi au fost: metoda bibliografică, metoda experimentală, metoda studiului de caz, metoda observaţiei, metoda testelor, metode statistico-matematice de prelucrarea a datelor, metoda grafică de prezentare a rezultatelor, testul Shapiro-Wilk, testul t-Student, testul parametric pentru date nepereche, respectiv testul Mann-Whitney, test non-parametric pentru date nepereche. **Rezultate:** Ca şi rezultate, din punct de vedere statistic, utilizând testul t-Student, $p<0,05$, am constatat că există o diferenţă semnificativă statistic între mediile valorilor abducţiei în săptămâna 8 şi 12 la cele 2 loturi. **Concluzii:** Tratamentul kinetic asigură ameliorarea componentei algice şi a parametrilor funcţionali, asigurând astfel îmbunătăţirea calităţii vieţii pacientului prin combaterea contracturilor musculare şi prin creşterea mobilităţii articulare.

Cuvinte cheie: *tendinită, fiziokinetoterapie, calcifiere.*

Introduction

Calcifying Tendinitis (CT) Shoulder a self-restricting shoulder syndrome defined by sedimentation of calcium salts in rotator cuff muscles. Terms equivalent are Calcific periarthritis, Calcifying Tendinitis (CT) Shoulder, a self-limiting disorder of shoulder described by sedimentation of calcium sodium in rotator cuff muscles. Words corresponding are Calcific periarthritis (Bosworth, 1941). The etiology stays uncertain with several recommended hypotheses of etiopathogenesis. The displaying symptom is usually pain affiliated via activity enduring for months through unexpected regression in particular incidents. Some enjoy long-standing pain and swelling, necessitating proactive intervention. This paper aims to evaluate the calcifying Tendinitis of the shoulder and effective administration alternatives for symptomatic incidents (Umamahesvaran et al., 2018).

Calcific Tendinitis of the shoulder is a severe or congenital pain disorder because of calcific buildups' existence within or throughout the rotator cuff's tendons. It is triggered by the sedimentation of calcium hydroxyapatite crystallites frequently inside the supraspinatus and infraspinatus tendons (Speed et al., 1999; DE Carli et al., 2014).

Rotator cuff condition of the shoulder features a wide range of conditions, amongst which calcific tendinopathy (CT) performs a well-known involvement. Though Calcifying Tendinitis is remarked predominantly in the shoulder, and it might stand discovered through the frame (Ea et al., 2014; Sansone et al., 2018).

Calcifying Tendinitis is a prevalent unpleasant condition described by ossifications in either the matter or inclusion of the RCT and the synovial matters constituting the subacromial bursa. Calciferous material constitutes calcium hydroxyapatite clumps in crystalline or shapeless shape (Chiou, 2010; Sansone et al., 2018).

Calcific Tendinitis corresponds to hydroxyapatite crystals' pathological sedimentation in tendons, spearheading to a restricted spectrum of motion of the associated joint. Calcific tendinopathy and hydroxyapatite sedimentation disorder are different terms that are used to indicate this disorder. The calcific buildups may cause responsive inflammatory transformations and may trigger agonizing discomfort. If the buildups are substantial, indeed, they may experience the manifestations of impingement. This disorder infects the shoulder's rotator cuff tendons typically; however, separate participation complexes are also recorded, such as the hip, elbow, wrist, and knee (Hayes, 1990; Kalaycı & Kızılkaya, 2019).

Calcific deposits are not frequently symptomatic and can be the collateral discoveries of the imaging research of whichever joint and periarticular soft tissues (Hayes et al., 1987; Kalaycı & Kızılkaya, 2019). On the different hand, some buildups may be a considerable origin of joint pain (Bosworth, 1941; Kalaycı & Kızılkaya, 2019) and perceive for 7% of shoulder discomfort (Speed et al., 1999; Kalaycı & Kızılkaya, 2019).

RCCT— Rotator cuff calcific tendinopathy is a pervasive disorder triggered by the existence of calcific buildups in the RC or the SASD— subacromial-subdeltoid bursa through ossification propagates across the sinews (Silvestri et al., 2017; Splendiani et al., 2014; Barile et al., 2013; Masciocchi et al., 2014; Chianca et al., 2018). This disorder has been posted in 2.5%-7.5% of healthful shoulders in grownups (Barile et al., 2017; Zappia et al., 2017; Arrigoni et al., 2017; Chianca et al., 2018), manifesting in women in approximately 70% of incidents, mainly through the 4th and fifth decades of existence (Clavert and Sirveaux, 2008; Reginelli et al., 2017; Di Pietto et al., 2017; Chianca et al., 2018) and seems not to be correlated to physical activity (De Filippo et al., 2017; Masciocchi et al., 2016; Barile et al., 2016; Chianca et al., 2018). In approximately 10–20% of patients, calcific deposits are multilateral.

The etymology of CT is, however, challenging. Many suppositions for the compulsive procedure have been indicated: degenerative (Benjamin et al., 2000; Sansone et al., 2018) repetitive trauma, (Benjamin et al., 2000; Sansone et al., 2018) tenocyte necrosis, (Benjamin et al., 2000; Sansone et al., 2018) reactive, (Uhthoff, 1997; Sansone et al., 2018) and endo-chondral ossification; (Uhthoff, 1975; Sansone et al., 2018) nevertheless, no-one of these interpretations has demonstrated to be completely acceptable. Moreover, extraneous variables such

as age and BMI have demonstrated to be affiliated with shoulder discomfort in CT. The growth in discomfort with age tightly resembles the assertions for rotator cuff tears (Yamamoto et al., 2011; Tashjian et al., 2012; Sansone et al., 2018) and likewise, some unusual Body Mass Index was as well discovered to appear a threat element for establishing an RCT—rotator cuff tear or tendinopathy. (Wendelboe et al., 2004; Gumina et al., 2014; Sansone et al., 2018)

Calcific Tendinitis is one of the too prevalent reasons for non-traumatic discomfort in the shoulder (Rogers and Hendrix, 1988; Steinbrocker, 1985 Kachewar & Kulkarni, 2013). Bosworth (Bosworth, 1941 Kachewar & Kulkarni, 2013) published a prevalence of 2.7% in 6061 asymptomatic department employees when each shoulder was evaluated by radiography; Uhthoff and Sarkar (Uhthoff, 1989 Kachewar & Kulkarni, 2013) reported that Welfing et al discovered an occurrence of 7.5% in 200 symptomless patients and of 6.5% in 925 symptomatic patients. Calcific Tendinitis is frequently uncovered in individuals of the elderly age communities (Hernandez-Santana et al., 2011; Hammer, 2007; Kachewar & Kulkarni, 2013), also representing a problem in team sports game too (Sopa, 2015; Sopa, 2019, Szabo et al. 2018, Szabo & Sopa, 2018).

Pre—calcification Stage

Patients typically do not enjoy any manifestations at this phase. The sites where the calcifications attend to establish undergo cellular transformations that influence the tissues to establish calcium buildups (Kachewar & Kulkarni, 2013).

Calcific Stage

Through this phase, calcium is excreted from cells, and it afterward coalesces into calcium buildups. Though it is noticed, the calcium looks calcareous. It is not a robust composition of bone. Once the calcification has been established, a so-called palliative phase starts with; this is not an unpleasant phase, and it might span for a diverse length of the period. After the resting period, a resorptive stage commences—this is the particularly agonizing chapter of calcific tendonitis. The calcium buildup looks like toothpaste deposits (Kachewar & Kulkarni, 2013).

Patients with CT usually existent extreme, disarming agony, who happens suddenly, typically in the forenoon. There may be corresponding rigidity, providing an increase to a cold shoulder-alike medical portrait. Convalescents might note frontal anguish, situated next to the bicephalous depression (in whom the long head of the biceps stands), or dorsal agony, situated underneath the scapula's spine. There might appear simultaneous contracture of the trapezius and rhomboids (DE Carli et al., 2014).

The administration of CT includes NSAIDs, frequently useful to liberate discomfort in the acute periods of the pathology, suitable physiotherapy to combat articular rigidity, nearby steroid injections, and more unprecedented medication techniques such as extracorporeal shock wave therapy (ESWT) and US-guided needling (UGN). Surgical withdrawal of the calcium buildups, open or arthroscopic, is typically deliberate after conservative procedure error. Nevertheless, in the light of the latest, actually if not convincing, advancements on the root and the means of the disease, a more deliberate and responsive therapeutic strategy might be desirable (Sansone et al., 2018).

Design of the Research

This investigation was overseen under the Declaration of Helsinki (2013). It also met the ethical standards for Sport and Exercise Science Research, and the General data protection regulation entered into the appliance on 25 May 2018 (Regulation (EU) 2016/679).

At the Rheum-Care Recovery and Rehabilitation Centre in Targu-Mures, we conducted a prospective study based on data from 20 patients diagnosed based on clinical and paraclinical signs with calcified shoulder tendinitis, mainly calcified supraspinous Tendinitis.

Following an analysis of the problem of our study, we issued the following working hypothesis:

• Applying conservative treatment in the early stages of calcified shoulder tendinitis on a group of 10 subjects (patients) for four months will produce statistically significant changes in the effectiveness of different treatment methods and the intensity of symptoms and the influence of the disease on the patient's quality of life.

• The effectiveness of the treatment applied is significantly higher when combining different types of therapeutic interventions.

Between 5 October 2019 and 5 February 2020, at the Rheum-Care Recovery and Rehabilitation Centre in Tirgu Mureș, we built a studio on the effectiveness of conservative treatment of calcified shoulder tendinitis. We tracked the evolution of 20 patients diagnosed based on clinical and paraclinical signs with calcified supraspinous Tendinitis and processed the data obtained from them to formulate the results and conclusions.

To be included in the study, patients were selected who presented to the doctor with functional symptomatology at the shoulder joint present for at least one month, without associated pathology that is contraindications of electrotherapy (cardiovascular diseases, epilepsy, tumors, active TB, skin

lesions at the site of application of electrodes, etc.) or other musculoskeletal or neurological diseases that could negatively influence functionality. In all cases, X-rays performed in two incidences (antero—posterior and latero—lateral) revealed calcium deposits on the tendon without bone structure changes. The exclusion criteria were the presence of diseases representing absolute contraindications of electrotherapy, fractures, or severe trauma of the studied shoulder, low adhesion to the recommended therapeutic plan, non-compliant patient, alcohol, or drug abuse. Two study groups were formed. In group I, the study group consisted of 10 subjects.

The electrotherapy procedures (shock therapy) were supplemented by 50 minutes of medical gymnastics daily, performed under the physiotherapist's supervision. Group II, considered the control group, consisting of 10 people, did not benefit from shock therapy, but only physical therapy. All subjects signed a form agreeing to participate in the study, and the confidentiality of personal data was respected in the processing of the data.

Recommended physiotherapy procedures:

- Extracorporeal shock wave therapy (ESWT): 2000 shocks, at a pressure of 3–4 bar, frequency of 10–15 Hz, applied two times a week, performing a total of 5 sessions. When applying shocks, we used a special gel for ESWT. The physiotherapy procedures and the physiotherapy program were performed with high-performance BTL-6000 series equipment within the recovery and rehabilitation center.
- The physiotherapy programs were made up of exercises performed in the closed and open kinetic chain, the main goal being muscle toning and restoration of joint mobility.

PHASE I: (WEEK 1–3)—RECUPERATION OF MOBILITY

I. Passive mobilizations of the scapulohumeral joint in the dorsal decubitus

1. Flexie
2. Abduction
3. External rotation
4. Internal rotation
5. Scapular mobilizations (back shoulder rotation)

II. Self-passive exercises

1. Scripts—assisted by the healthy hand
2. Shoulder wheel
3. Self-passive exercises with the cane

III. Active exercises:

1. Birding the ball around the body

2. From the seat, the hand on the Bobath ball performs flexion-extension of the scapulohumeral joint

3. From the dorsal decubitus, the supinal outlet performs scapulohumeral flexion to the painful threshold

PHASE II: (WEEK 4–6)—RECUPERATION OF MUSCULAR FORCE

I. Self-passive exercises with a cane (heating):

a) abduction

b) flexion

c) extension

II. Active exercises

1. Birding the ball around the body

2. Running the Bobath ball on the trellis up

3. With the dumbbell of 1kg, the patient, runs (to the painful point)

4. Internal-external rotations with the elbow flexed at 90° (side decubitus)

5. Isometric exercises with Thelaband

a) flexion

b) abduction

6. Isometry on the pectoral muscle (adduction)—squeeze stalk the ball between the palms with 90° flexion of the scapulohumeral joint

7. CODMAN Pendulums

PHASE III: (WEEK 7–9)—RECOVERY OF MUSCULAR RESISTANCE AND CONTINUATION OF MUSCULAR FORCE GROWTH

I. Active heating

a) flexion

b) abduction

c) circumductions (antero-posterior)

II.1. Active exercises with 2kg (male) and 1kg (female)

a) flexion

b) abduction

c) slightly sloping extension

2. External rotations with 1kg at the trellis (shoulder and elbow flexed at 90°)

3. Internal rotations with resistance (Theraband)

4. Isometric exercises with Thelaband
a) flexion
b) abduction
5. Ramat with Posterior Theraband (shoulder and elbow flexed at 90°)
6. Floats with knee support
7. Adductions with Theraband over the chest
8. Isometry on the pectoral muscle
9. CODMAN Pendulums

PHASE IV: (WEEK 10–12)—RECOVERY OF EXPLOSIVE FORCE
I. Active heating
a) flexion
b) abduction
c) circumductions (antero-posterior)
II. Active exercises
1. Shoulder press with 2kg dumbbell
2. Ramat with dumbbell 4/5 kg
3. Explosive countertop movements:
a) adductions-abducts -15"/15" pause
b) flexes-extensions -15"/15" pause
4. Birding the ball around the body at the maximum mobility point - 15"/15" pause
5. Circumductions cotratime
a) previous -15"/15" pause
b) posterior -15"/15" pause
6.Thelaband abduction (flexed shoulder and added to 90°)
7.Throwing the ball to the wall
8. CODMAN Pendulums

Clinical-functional evaluation of patients was carried out at the beginning and end of each phase. The intensity of pain was evaluated on the visual analog scale. Using illustrations and scores, patients were asked to indicate the illustration that best corresponds to the condition they are experiencing. 0 describes the absence of pain, and 10 describes a high-intensity, unbearable pain.

The shoulders' joint balance was performed from the dorsal decubitus position to assess the active joint mobility. The term comparison was the angle of motion of the same segment of the opposite limb and the shared values of the maximum amplitudes of joint movements. The evaluation of the functionality of day-to-day activities was carried out using The Disabilities of the Arm, Shoulder, and Hand (DASH) Score. Based on 17 items related to the difficulty of carrying

out daily activities, the patient's functional condition is evaluated. The score is expressed in percentages, with values between 0 and 100. A lower score indicates a significant impairment of functional ***status.***

Results

Statistical analysis included descriptive statistics (frequency, average, median, standard deviation), and inferential statistics elements. The Shapiro-Wilk test was applied to determine the distribution of the analyzed data series. Comparing medium and medians was applied the t-Student test, parametric test for unpaired data, respectively the Mann-Whitney test, non-parametric test for unpaired data. The significance threshold chosen for the p-value was 0.05. The statistical analysis was performed using the GraphPad Prism trial variant utility.

Table 1. Research subjects

	Experimental group	**Control group**
Female gender	6	7
Male gender	4	3
Total	10	10

Table 2. Abduction weeks 1 and 4

ABDUCTION WEEK 1	**Experimental group**	**Control group**	**ABDUCTION WEEK 4**	**Experimental group**	**Control group**
Number of values	10	10	Number of values	10	10
Minimum	55,00	50,00	Minimum	85,00	70,00
25% Percentile	58,75	71,25	25% Percentile	93,75	93,75
Median	75,00	85,00	Median	115,0	112,5
75% Percentile	86,25	93,75	75% Percentile	126,3	121,3
Maximum	90,00	110,0	Maximum	130,0	130,0
Mean	73,00	83,00	Mean	110,5	108,5
Std. Deviation	13,78	18,44	Std. Deviation	16,91	18,42
Std. Error	4,359	5,831	Std. Error	5,346	5,824
Lower 95% CI of mean	63,14	69,81	Lower 95% CI of mean	98,41	95,33
Upper 95% CI of mean	82,86	96,19	Upper 95% CI of mean	122,6	121,7

Table Analyzed	Data 1	Table Analyzed	Data 2
Column A	Experimental group	Column A	Experimental group
vs	vs	vs	vs
Column B	Control group	Column B	Control group
Unpaired t test		Unpaired t test	
P value	0,1864	P value	0,8031
P value summary	ns	P value summary	ns
Are means signif. different? (P < 0.05)	No	Are means signif. different? (P < 0.05)	No

T-Student test, p>0.05, shows no statistically significant difference between the 1st-week abduction values' averages in the two lots.

T-Student test, p>0.05, shows no statistically significant difference between the 4th-week abduction values' averages in the two lots.

Table 3. Abduction weeks 8 and 12

ABDUCTION WEEK 8	Experimental group	Control group	ABDUCTION WEEK 12	Experimental group	Control group
Number of values	10	10	Number of values	10	10
Minimum	130,0	120,0	Minimum	170,0	145,0
25% Percentile	140,0	127,5	25% Percentile	175,0	153,8
Median	150,0	137,5	Median	177,5	155,0
75% Percentile	156,3	145,0	75% Percentile	180,0	160,0
Maximum	160,0	150,0	Maximum	180,0	165,0
Mean	148,5	136,0	Mean	177,0	156,0
Std. Deviation	9,733	10,75	Std. Deviation	3,496	5,676
Std. Error	3,078	3,399	Std. Error	1,106	1,795
Lower 95% CI of mean	141,5	128,3	Lower 95% CI of mean	174,5	151,9
Upper 95% CI of mean	155,5	143,7	Upper 95% CI of mean	179,5	160,1

Table Analyzed	Data 3	Table Analyzed	Data 4
Column A vs Column B	Experimental group vs Control group	Column A vs Column B	Experimental group vs Control group
Unpaired t test		Unpaired t test	
P value	0,0139	P value	0,0002
P value summary	*	P value summary	Gaussian Approximation ***
Are means signif. different? (P< 0.05)	Yes	Are means signif. different? (P< 0.05)	Yes

T-Student test, p>0.05, shows a statistically significant difference between the abduction score values' averages in week 8 in the two lots.

T-Student test, p>0.05, shows a statistically significant difference between the abduction score values' averages in week 12 in the two lots.

Table 4. VAS scale weeks 1 and 4

VAS SCALE WEEK 1	**Experimental group**	**Control group**	**VAS SCALE WEEK 4**	**Experimental group**	**Control group**
Number of values	10	10	Number of values	10	10
Minimum	6,000	6,000	Minimum	4,000	5,000
25% Percentile	7,000	7,000	25% Percentile	4,750	5,000
Median	8,000	8,000	Median	5,000	6,000
75% Percentile	9,000	9,000	75% Percentile	6,250	7,000
Maximum	10,00	10,00	Maximum	8,000	8,000
Mean	8,000	7,900	Mean	5,500	6,000
Std. Deviation	1,155	1,197	Std. Deviation	1,269	1,054
Std. Error	0,3651	0,3786	Std. Error	0,4014	0,3333
Lower 95% CI of mean	7,174	7,044	Lower 95% CI of mean	4,592	5,246
Upper 95% CI of mean	8,826	8,756	Upper 95% CI of mean	6,408	6,754

Table Analyzed	Data 5	Table Analyzed	Data 6
Column A vs Column B	Experimental group vs Control group	Column A vs Column B	Experimental group vs Control group
	Unpaired t test		Unpaired t test
P value	0,8513	P value	0,3506
P value summary	ns	P value summary	ns
Are means signif. different? (P < 0.05)	No	Are means signif. different? (P < 0.05)	No

T-Student test, p>0.05, shows no statistically significant difference between the VAS score values' averages in week 1 in the two lots.

T-Student test, p>0.05, shows no statistically significant difference between the VAS score values' averages in week 4 in the two lots.

Table 5. VAS scale weeks 8 and 12

VAS SCALE WEEK 8	**Experimental group**	**Control group**	**VAS SCALE WEEK 12**	**Experimental group**	**Control group**
Number of values	10	10	Number of values	10	10
Minimum	2,000	3,000	Minimum	0,0	2,000
25% Percentile	2,750	4,000	25% Percentile	0,0	3,000
Median	3,000	5,000	Median	0,0	3,500
75% Percentile	4,000	5,250	75% Percentile	1,000	4,000
Maximum	7,000	6,000	Maximum	1,000	4,000
Mean	3,400	4,800	Mean	0,3000	3,400
Std. Deviation	1,430	0,9189	Std. Deviation	0,4830	0,6992
Std. Error	0,4522	0,2906	Std. Error	0,1528	0,2211
Lower 95% CI of mean	7,174	7,044	Lower 95% CI of mean	-0,04555	2,900
Upper 95% CI of mean	8,826	8,756	Upper 95% CI of mean	0,6456	3,900

Table Analyzed	Data 7	Table Analyzed	Data 8
Column A vs Column B	Experimental group vs Control group	Column A vs Column B	Experimental group vs Control group
	Unpaired t test		Unpaired t test
P value	0,0111	P value	0,0001
P value summary	Gaussian Approximation	P value summary	Gaussian Approximation
Are means signif. different? (P < 0.05)	Yes	Are means signif. different? (P < 0.05)	Yes

T-Student test, p>0.05, shows a statistically significant difference between the VAS score values' averages in week 8 in the two lots.

T-Student test, p>0.05, shows a statistically significant difference between the VAS score values' averages in week 12 in the two lots.

Table 6. DASH scale weeks 1 and 4

DASH SCALE WEEK 1	**Experimental group**	**Control group**	**DASH SCALE WEEK 4**	**Experimental group**	**Control group**
Number of values	10	10	Number of values	10	10
Minimum	58,70	58,50	Minimum	46,10	40,10
25% Percentile	62,85	60,45	25% Percentile	47,98	42,08
Median	69,95	64,85	Median	51,05	46,85
75% Percentile	79,20	71,08	75% Percentile	56,20	57,88
Maximum	81,30	75,30	Maximum	62,60	60,20
Mean	69,93	65,85	Mean	52,55	49,05
Std. Deviation	8,250	6,035	Std. Deviation	5,484	7,811
Std. Error	2,609	1,909	Std. Error	1,734	2,470
Lower 95% CI of mean	64,03	61,53	Lower 95% CI of mean	48,63	43,46
Upper 95% CI of mean	75,83	70,17	Upper 95% CI of mean	56,47	54,64

Table Analyzed	Data 9	Table Analyzed	Data 10
Column A vs Column B	Experimental group vs Control group	Column A vs Column B	Experimental group vs Control group
Unpaired t test		Unpaired t test	
P value	0,2230	P value	0,2613
P value summary	ns	P value summary	ns
Are means signif. different? (P < 0.05)	No	Are means signif. different? (P < 0.05)	No

T-Student test, p>0.05, shows no statistically significant difference between the DASH score values' averages in week 1 in the two lots.

T-Student test, p>0.05, shows no statistically significant difference between the DASH score values' averages in week 4 in the two lots.

Table 7. DASH scale weeks 8 and 12

DASH SCALE WEEK 8	**Experimental group**	**Control group**	**DASH SCALE WEEK 12**	**Experimental group**	**Control group**
Number of values	10	10	Number of values	10	10
Minimum	20,80	26,40	Minimum	5,300	17,60
25% Percentile	25,68	28,30	25% Percentile	8,925	18,63
Median	33,20	31,60	Median	10,80	20,10
75% Percentile	38,78	38,63	75% Percentile	16,70	20,83
Maximum	44,30	44,90	Maximum	19,60	29,70
Mean	32,68	33,40	Mean	12,12	20,68
Std. Deviation	7,633	6,158	Std. Deviation	4,491	3,363
Std. Error	2,414	1,947	Std. Error	1,420	1,064
Lower 95% CI of mean	27,22	28,99	Lower 95% CI of mean	8,908	18,27
Upper 95% CI of mean	38,14	37,81	Upper 95% CI of mean	15,33	23,09

Table Analyzed	Data 11	Table Analyzed	Data 12
Column A vs Column B	Experimental group vs Control group	Column A vs Column B	Experimental group vs Control group
	Unpaired t test		Unpaired t test
P value	0,8190	P value	0,0005
P value summary	ns	P value summary	Gaussian Approximation
Are means signif. different? (P < 0.05)	No	Are means signif. different? (P < 0.05)	Yes

T-Student test, p>0.05, shows no statistically significant difference between the DASH score values' averages in week 8 in the two lots.

T-Student test, p>0.05, shows a statistically significant difference between the DASH score values' averages in week 12 in the two lots.

Discussions

Our study shows that extracorporeal shock wave therapy of calcified shoulder tendinitis is useful in the long term compared to kinetic treatment. A lot of research has illustrated the effectivity of extracorporeal shock wave therapy (ESWT), either focal (FESWT) or radial (RESWT), in calciferous shoulder tendinopathy. ESWT is predicated on the deployment of individual stress poundings or shock waves. Through American or Radiographic guidelines, they are focused on calcification. ESWT enjoys appeared posted to provide respectable outcomes. However, there appear no Level 1 statements in the literature. Lee and collaborators, in a methodical investigation, published acceptable testimony endorsing the usage of FESWT.

We recommend physical-kinetic treatment in the case of calcified Tendinitis in the shoulder. It is known that nowadays, the most used is pharmacological treatment by the administration of nonsteroidal anti-inflammatory drugs. These drugs can give gastric, hepatic, cardiovascular, hematological, or renal side effects. Physiotherapy procedures are non-invasive, free of adverse effects if precise indications and contraindications have been taken into account when prescribing them. The physical—kinetic treatment provides all the elements that constitute the picture of safe and accurate recovery in current pathologies.

Calcific Tendinitis of the shoulder is a complicated situation to supervise with different therapy alternatives. (ElShewy, 2016) While concrete footpaths reside for supervision, this research is a possibility to showcase regulations and treatment. With the assistance of the patient's status, occupation, VAS pain scorelines, the timespan of treatment compensation, the number of patient visits, and our present administration footpaths, we have assembled an algorithm that may be observed as a criterion by our elementary care physicians patients with alleged calcific Tendinitis. There may be some incidents that might differ and might be customized to be regarded as patient-specific as required (ElShewy, 2016; Raja et al; 2019).

Calcifying Tendinitis of the rotator cuff is a prevalent condition of the shoulder. Women are more commonly involved than men (Balke, 2012; Castagna, 2016). The medical scorelines (Constant, ASES, UCLA, VAS, SST) enhanced considerably in between baseline and six months postoperatively sans any disparity among the two groups (Constant, 1987; Castagna, 2016). Additionally, following six months, both groups also demonstrated clinical enhancements (Castagna, 2016).

Conclusions

Following the study, the hypotheses were confirmed. Extracorporeal shock wave therapy combined with kinetic treatment has been more effective in the long term than the kinetic program to improve the algal component and increase the functional level. Extracorporeal shock waves, by mechanical effect, produce a slight dislocation of calcium crystals deposited in the tendon of the supraspinous muscle and, at the same time, produce neovascularization in the area affected by chronic inflammation. Kinetic treatment ensures improvement of the algal component and functional parameters, thus ensuring the patient's quality of life by combating muscle contractions and increasing joint mobility.

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THE EFFECTIVENESS OF POSTURAL BIOFEEDBACK IN THE PHYSICAL THERAPY OF PATIENTS WITH CERVICAL SPONDYLOSIS

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ABSTRACT. Background. The influence of biofeedback treatment with the help of the Global Postural System GPS 600 device combined with a physiotherapy program for the cervical spine proved to be beneficial. The presence of headaches and the sensitivity of the cervical spine given by arthrosis, require that the movements at this level must be done very carefully. **Aim.** The aim of this study is to prove the importance and benefits of biofeedback treatment using the Global Postural System GPS 600 combined with a physical therapy program in degenerative diseases of the cervical spine for adults involved in work activities that require maintaining a sitting position at the office **Subjects**. This study included 30 patients with the age between 28 to 59 years old, the mean age was 38 years. **Methods.** The methods used for evaluation were joint and muscle balance as well as the visual analogue scale of pain, and the evaluation data provided by the GPS 600 system. **Results.** At the end of the 14 days of biofeedback treatment and physical therapy program, all patients had a relief of symptoms and the alignment of the spine was significantly corrected. **Conclusion.** Biofeedback treatment using the Global Postural System GPS 600 combined with physical therapy is important in the recovery of degenerative diseases of the cervical spine both for the effect on the joints and for the general effect of postural balance.

Keywords: *physiotherapy, cervical pain, work posture, biofeedback.*

REZUMAT. ***Eficiența biofeedback-ului postural în kinetoterapia pacienților cu spondiloză cervicală.*** **Introducere**. Influența tratamentului biofeedback cu ajutorul dispozitivului Global Postural System GPS 600 combinată cu un program de kinetoterapie pentru coloana cervicală s-a dovedit a fi benefică. Prezența cefaleei și sensibilitatea coloanei cervicale datorate spondilartrozei necesită

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acordarea unei atenţii deosebite mişcărilor de la acest nivel. **Scop**. Scopul acestui studiu este de a dovedi importanţa şi beneficiile tratamentului biofeedback folosind sistemul postural global GPS 600 combinat cu un program de kinetoterapie în bolile degenerative ale coloanei cervicale pentru adulţii implicaţi în activităţi de lucru ce necesită menţinerea unei poziţii aşezate la birou. **Subiecţi.** Acest studiu a inclus 30 de pacienţi cu vârsta cuprinsă între 28 şi 59 de ani, vârsta medie fiind de 38 de ani. **Metode**. Metodele utilizate pentru evaluare au fost bilanţul articular şi testingul muscular, scala vizuală analogă a durerii şi datele de evaluare furnizate de sistemul GPS 600. **Rezultate**. La sfârşitul celor 14 zile de tratament biofeedback şi a unui program de kinetoterapie, toţi pacienţii au avut o reducere a simptomelor, iar alinierea coloanei vertebrale a fost îmbunătăţită semnificativ. **Concluzii.** Tratamentul biofeedback cu ajutorul sistemul postural global GPS 600 combinat cu kinetoterapia este important în recuperarea pacienţilor cu boli degenerative ale coloanei cervicale atât în privinţa efectului asupra articulaţiilor, cât şi pentru efectul asupra echilibrului postural.

***Cuvinte cheie*:** *fizioterapie, durere cervicală, postură de lucru, biofeedback.*

Background

The cervical spine is made up of specific anatomical elements through which it fulfils its role in the articular economy of the musculoskeletal system, ensuring both mobility and stability of the cephalic extremity. The attrition of this area, whose structure and resistance decrease under the evolution of the degenerative and inflammatory process leads to the suffering of the joints with special clinical manifestations, due to the very important anatomical vasculo-nervous formations with which it borders. The influence of biofeedback treatment with the Global Postural System GPS 600 and a special physiotherapy program on the cervical spine is much greater than it seems at first glance.

The presence of headaches and the sensitivity of the cervical spine given by cervicarthrosis, require that the movements at this level must be done very carefully**.** Biofeedback treatment with the help of the Global Postural System GPS 600 and a physical therapy program it has been shown to be superior to classical medicine drugs due to the improvement of function and quality of life (Holøyen PK & Stensdotter AK 2018, Chelaru HE & Buldus CF 2019).

Cervicarthrosis is a degenerative disease of the cervical spine who damage the joint structures: cartilage, periarticular *structures,* and neighbouring bone. The causes of cervicarthrosis *are* mechanical stress, metabolic disorders, vascular changes, ligament hyperlaxity, static disorders, congenital malformations (Held JP, Dizien O. 1998).

In the USA. cervicarthrosis is common, being estimated at 2% of those who are hospitalized. It is the most common cause of spinal cord dysfunction in patients older than 55 years. Based on radiological investigations, 90% of men over 50 years of age and 90% of women over 60 years of age have degenerative changes in the cervical spine. Internationally, the evaluators reported a study of 225 patients with headaches, 143 (64%) had cervical osteoarthritis (cervical spondylosis) and 80 people without headaches 29 (36%) had the same condition (Liang H, et all. 2020).

The development of cervicarthrosis is a long-lasting process. Patients may either remain asymptomatic or have mild neck pain. Long periods of disability are typical and there are cases in which the patient's condition progressively deteriorates (Rodríguez-López ES, et all. 2019).

Research framing

To highlight the benefits of biofeedback treatment using the Global Postural System GPS 600 and the need for physical therapy on patients who maintain a sitting position at the office for 5-6 hours a day, we chose 30 patients with cervical osteoarthritis, employed in various specializations that involves working in the office and maintaining a sitting position between 6-8 hours a day. We studied patients between the ages of 28 to 59, the average age was 46 years.

The subjects investigated in this study developed changes in posture caused by working in a sitting position between 6-8 hours.

Distribution of the patients by the place of their origin: we studied 30 patients, of which 20 patients came from urban areas and 10 patients from rural areas.

Distribution of patients by the number of their work: we studied 30 patients, of which 12 patients had work 6 hours / day in a sitting position and 18 patients had work 8 hours / day in a sitting position.

Hypothesis

The biofeedback treatment with the Global Postural System GPS 600 combined with a special spine physiotherapy program improves the function of the spine if it is applied individually based on clinical and functional diagnosis. The aim of this study is to demonstrate the importance of biofeedback treatment with the help of the Global Postural System GPS 600 and the physiotherapy program in the recovery of cervical spine diseases in patients who have a job that involves a long stay at the office. The differences that appear at the functional diagnosis will be observed.

Aim

The aim of this study is to prove the importance and benefits of biofeedback treatment using the Global Postural System GPS 600 combined with a physical therapy program in degenerative diseases of the cervical spine for adults involved in work activities that require maintaining a sitting position at the office Materials

The study took place within the HC Kinetic Med Recovery Centre in Cluj Napoca, which is equipped with 2 physiotherapy rooms, 3 massage rooms, 1 diagnostic and treatment room with GPS 600 device.

Methods

As methods of evaluating the patients, we used posture assessment and spine alignment, joint and muscle balance and analogue visual pain scale and evaluation with the GPS 600 device. We applied all these methods both at the beginning of the treatment and at the end of the physiotherapy sessions.

Other methods used were bibliographic study, observation method, anamnesis, statistical analysis, and graphical representation.

The method used for the applied postural re-education was the one through biofeedback on the GPS 600 device combined with a physiotherapy program.

The treatments for re-educating the posture with the GPS 600 device were carried out as follows: the subjects came to treatment 5 days / week for 2 weeks.

During the treatment, the patients had to maintain their body position / posture as indicated by the device that the posture should be balanced. During each treatment, the correct posture was maintained 10 times for 20 seconds.

The individualized kinetotherapy treatments consisted in performing 15 exercises of 7 series of 10 repetitions, 2 weeks 5 days / week.

Results

The data from the GPS 600 posturograph regarding head anteriority before and after the intervention are showed in figures 1 and 2.

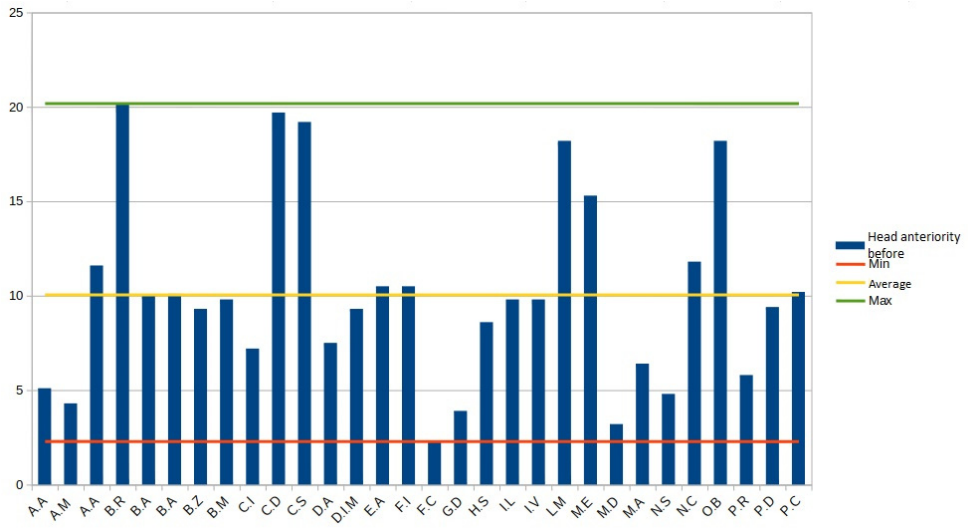

Figure 1. Head anteriority before the intervention (cm)

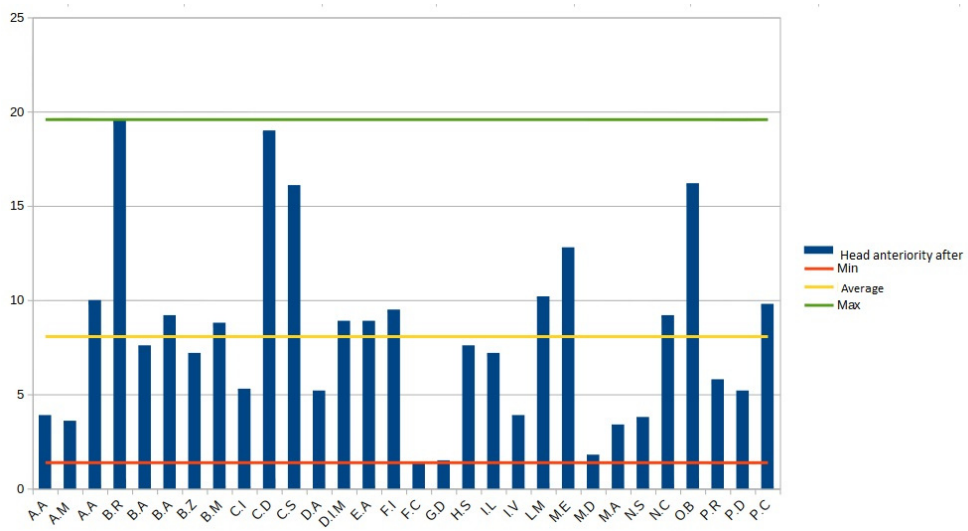

Figure 2. Head anteriority after the intervention (cm)

The improvement of head posture analysis is shown in figure nr.3

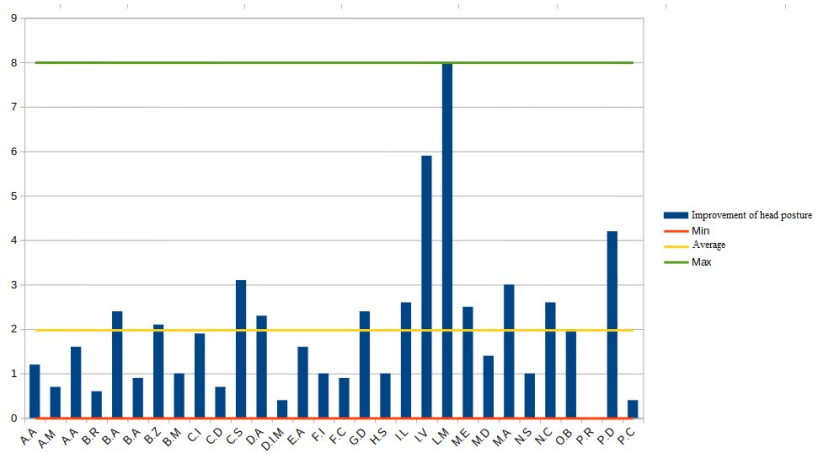

Figure 3. The improvement of head posture analysis

The anteriority of the head changed as follows: at 12 people the anteriority of the head was corrected between 0.0-1.0 cm; at 6 people the anteriority of the head was corrected between 1.1-2.0 cm; at 8 people the anteriority of the head was corrected between 2.1-3.0 cm; at 4 people the anteriority of the head was corrected between 3.1-8.0 cm.

The comparison analysis of data from the GPS 600 posturograph regarding weight charge on each foot before and after the intervention is shown in figure 4.

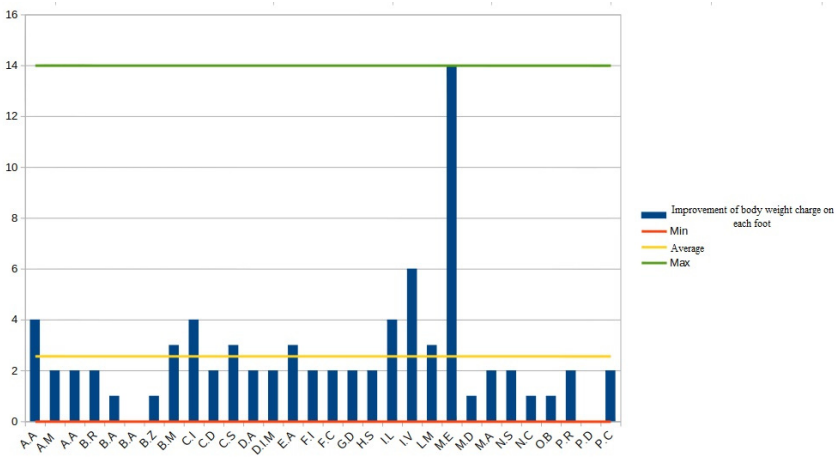

Figure 4. The improvement of body weight charge on each foot

The improvement of centre of gravity oscillations analysis is shown in figure nr.5

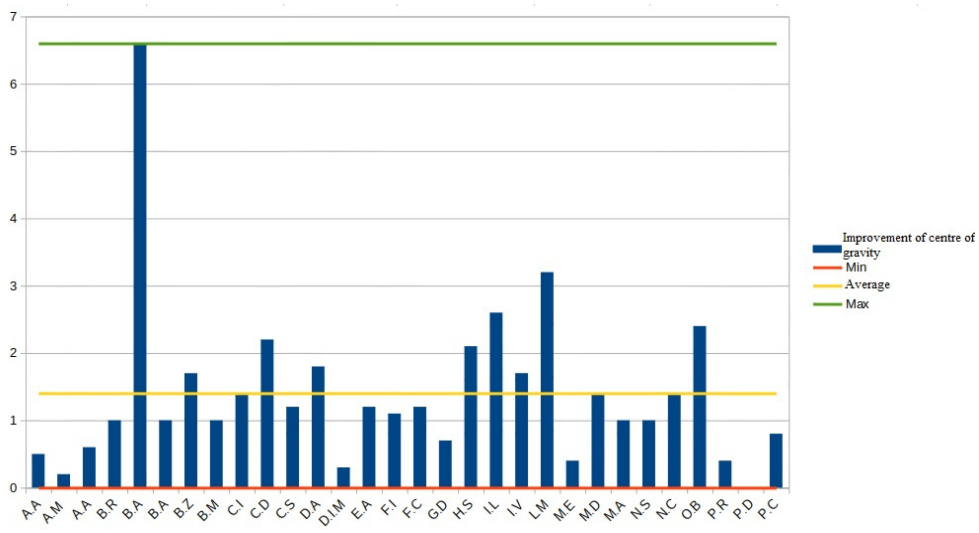

Figure 5. The improvement of centre of gravity oscillations

At the end of the 14 days of treatment, the group of 30 patients have significantly corrected the alignment of the spine and the postural balance.

The post-treatment joint assessment showed that the degree of mobility improved in all patients. On average, the increase in mobility in all patients was 1.5 cm. The patients with cervical osteoarthritis had an increase in mobility between 1 and 2.

Muscle testing performed before and after treatment shows that all patients reached higher values of muscle strength by 1 unit.

The pain decreased significantly in all patients by 2-4 degrees proving the effectiveness of the physiotherapeutic treatment combined with the biofeedback treatment with the Global Postural System GPS 600.

All these differences from joint balance, muscle testing and pain assessment, reduction of head anteriority show the effectiveness of the individualized applied treatment.

Conclusion

The postural deficits identified with the Global Postural System GPS 600 device produced over time musculoskeletal injuries associated with the office work posture in a prolonged position.

Physical therapy is important in recovering the damage of the cervical spine through the effect on the joints as well as through general effect.

Physical therapy applied individually according to the pathology of the patients, helped to alleviate the symptoms caused by cervicarthrosis.

The biofeedback treatment with the Global Postural System GPS 600 changed the memory of the muscles, leading the muscle fibres to maintain the newly learned position.

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PHYSICAL ACTIVITY LEVEL DURING PANDEMIC – A PILOT STUDY

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ABSTRACT. The aim of our study was to find out about physical activity level, during this pandemic period. Nowadays the entire society is affected, by this pandemic, socially, economically and sport activities as well. According to our data, people from this sample have a high level of physical activity, but they declared to have a lower fitness level reported to previous years.

Keywords: *vigorous physical activity, moderate physical activity, walking activity, gender, physical activity.*

REZUMAT. ***Nivelul de activitate fizică în timpul pandemiei - studiu pilot.*** În această perioadă umanitatea se confruntă cu mari provocări, medicale, sociale şi economice. Stilul de viaţă al tuturor a avut de suferit, oamenii fiind nevoiţi să depună eforturi considerabile pentru a se adapta, cât mai repede, la situaţiile apărute. Sectorul activităţilor fizice sportive, datorită închiderii activităţii cluburilor sportive, a avut şi el de suferit, cu implicaţii asupra nivelului de fitness.

Cuvinte cheie: *activitate fizică viguroasă, activitate fizică moderată, mersul pe jos, gen, activitate fizică.*

Introduction

This pandemic situation, caused by the COVID-19, still affects the entire world, economically, socially, sports events being included too. During lock down, and immediately after, sport activities were affected, many of them being forbidden, in order to reduce the virus spreading (Ashley, 2020, p. 39). In Italy

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and in several countries, for reducing the spread of the virus, people have to adopt self-isolation and trying to find home workout in order to stay active (Maugeri et al., 2020, p.1). The actual pandemic represents a real threat for health and lifestyle of humankind. The field of physical activities, which is part of a healthy lifestyle, was also affected (Woods et al., 2020, p.55).

The restrictions imposed by this pandemic, lockdown, school closures, have increased the stress for parents and kids. If this situation will continue, kids risk for developing depression, anxiety, and cognitive problems, which could affect their adulthood life (Arantes de Araújo, Veloso, Matheus de Campos Souza, Coelho de Azevedo, Tarro, 2020, p.9).

Schools closures in most of the countries, reduced physical activities which could conduct to increase the risk for obesity (Ruopeng, 2020, p. 302).

During lockdown the fitness sport clubs were closed, the pandemic situation has affected the lifestyle of adult peoples too. Many adults and children have changed their usual sport activities. Some of them have preferred to be involved in outdoor activities like running, cycling, open water swimming, hiking, in this way trying to stay in shape physically and emotionally. In Romania some of the swimming pools are still closed, therefore most of the children who were attending swimming classes have switched to basketball, football, tennis and track and field practices.

Material and methods

In this study we have used the following research methods: bibliography study, IPAQ self-administrated short form (International Physical Activity Questionnaire (http://www.ipaq.ki.se), it was translated and adapted, on Google formula, for being used on line, and SPSS 19 statistical program. We have also used Chi square test at p=.05 significance level and cross tabulation. The BMI was calculated and expressed in units of kg/m^2 (National Heart Lung and Blood Institute, Calculate your body mass index, n.d. para.1).

To establish the physical activity level, starting from what the subjects have declared, we have used the IPAQ scoring protocol (https://sites.google.com/site/theipaq/scoring-protocol).

Total days and time (in minutes) usually spent by being involved in vigorous activities (called MET, minutes a week), were multiplied by a given value 8. The number of days multiplied with the time spent by doing moderate activities was multiplied by a given value 4. Concerning walk activities, the time spent walking were multiplied by the value 3.3. After obtaining all the values (the total minutes in each category), these were added up to establish the physical activity level into the following categories: low, moderate and high.

The guideline for "the data processing and analysis of the IPAQ" describes three categories of physical activity.

High – in this case we have two aspects - vigorous intensity, at least, 3 days and accomplish at least 1500 minutes/week; or 7 days walking, moderate, vigorous activities achieving 3000 minutes/week.

Moderate – means 3 or more days with vigorous activities spending at least 20 minutes/day; 5 days walking or moderate activities for a period of minimum 30 minutes/day; 5 or more days walking, moderate and vigorous intensity minimum 600 min/week.

Low – for those who do not accomplish the criteria mentioned in the two situations presented above (IPAQ, IPAQ scoring protocol, n.d. para.1.).

A total of 57 people (average age 41.36), female (n=29), male (n=28) were involved in our study.

Results

There is statistically significant difference between genders regarding the BMI (χ^2= 27.7, df = 3, p ≤ 0.001). Most men who were involved in this study, 18 of them fell into the overweight category, meanwhile 23 women out of 29 have normal weight (Chart no.1).

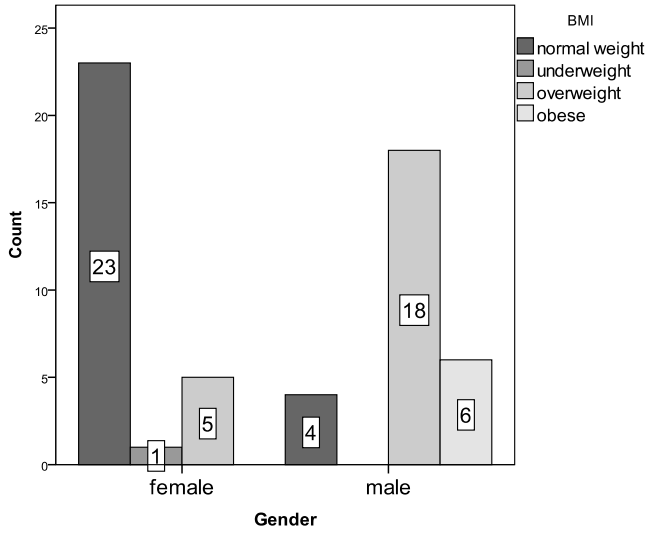

Chart no. 1. Gender and body mass index

Among 57 participants of the study, 10 of them declared that they took part in vigorous activities five days per week, while 11 of them aren't involved in any vigorous activities (Chart no. 2). Cross tabulation research method revealed that statistically there is no significant difference between genders respecting vigorous activities (χ^2= 5.29, df = 7, p= .624).

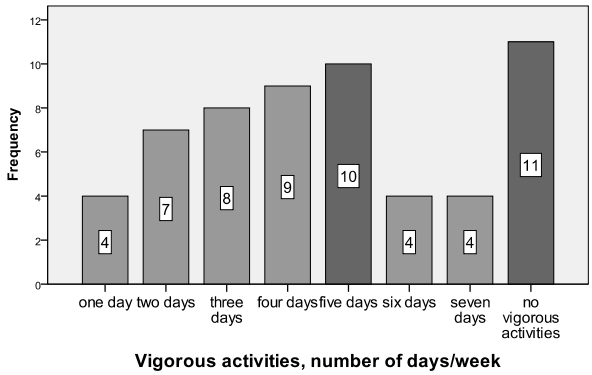

Chart no. 2. Vigorous activities per week

According to the results, statistically there is no significant difference, at the level of gender, concerning the time spent in vigorous activities (χ^2= 15.01, df = 12, p= .240). Thirteen participants out of 57 were involved in vigorous activities within 30-40 minutes once a week as they have declared (Chart no.3).

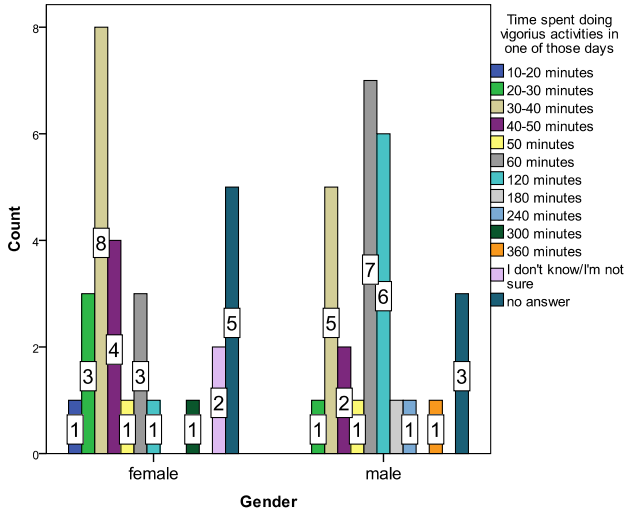

Chart no. 3. Gender and time spent doing vigorous activities

Cross tabulation disclosed that there is no statistically significant difference between genders respecting their participation in moderate activities during a week (χ^2 = 12.75, df = 7, p= .078). Six females, from 29, are involved three days in moderate activities, meantime 4 male out of 28, reported the same number of days (Chart no.4).

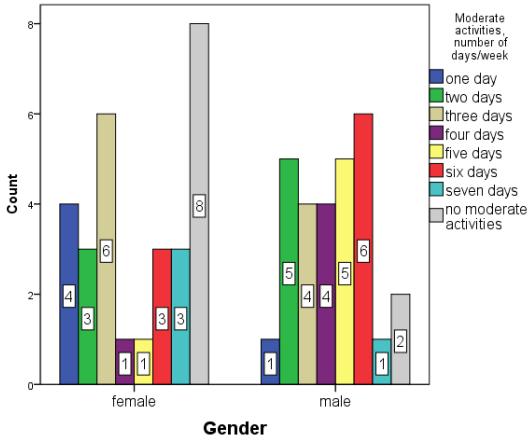

Chart no. 4. Gender and moderate activities days/week

According to our statistical analysis the subjects are involved in moderate activities, usually, one hour (Chart no. 5). There is no statistically significant difference at the level of gender and their time spent in moderate activities (χ^2 = 11.3, df = 10, p= .334).

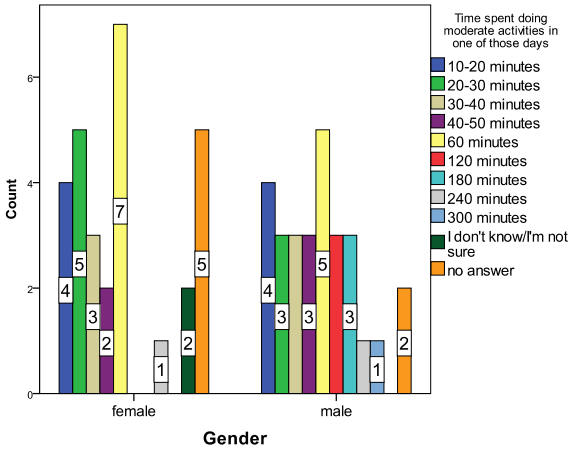

Chart no. 5. Gender and time spent involved in moderate activities

One of the items, from the IPAQ, was about walking activities during a week. There is no statistically significant difference at the level of gender and their walking activity realized in a week (χ^2 = 9.62, df = 7, p= .211). Five female and five male, from the total subjects, declared that they walk (from different locations to another) 5 days per week. Twenty-two of them declared that they walk seven days per week. (Chart no. 6).

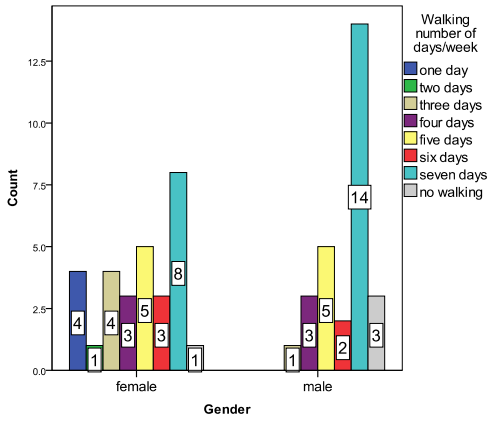

Chart no. 6. Gender and walking activity per week

Most subjects involved in our study 12 out 57, spend one hour of walking activities (Chart no. 7). At the level of gender there is not a statistically significant difference respecting the time spent walking (χ^2 = 11.66, df = 11, p= .390).

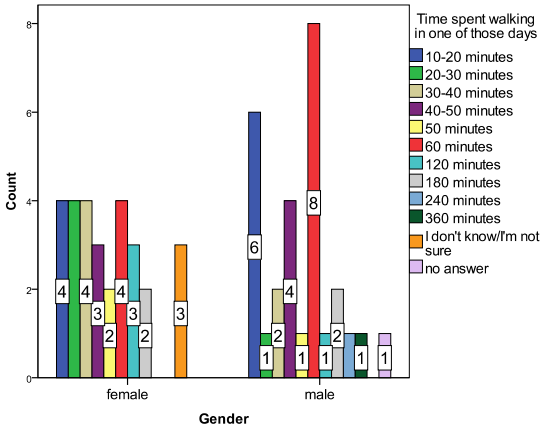

Chart no. 7. Gender and the time spent walking

People from this study, more exactly 14 out of 57 declared that they spend six hours per day sitting during a week (Chart no. 8). There is not a statistically significant difference at the level of gender and the time spent seated (χ^2 = 5.77, df = 9, p= .763).

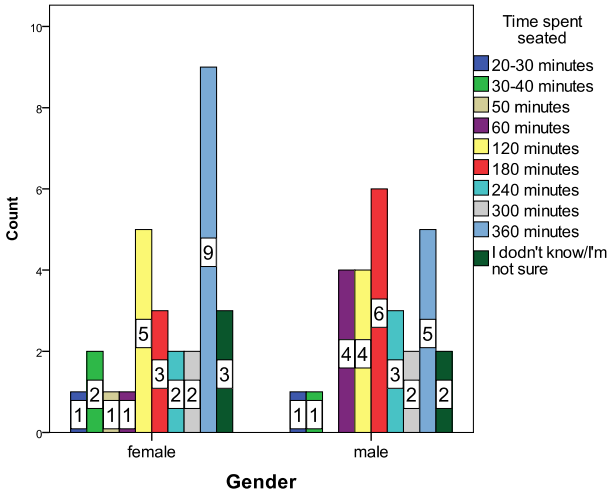

Chart no. 8. Gender and time spent seated

According to our data, which allowed us to establish the total time of vigorous, moderate and walking activities, 29 people have a high level of physical activity, 23 of them a moderate level and 5 of them have a low physical activity level (Chart no. 9). In this case we, also, had a statistically significant difference (χ^2 = 6.49, df = 2, p= .039).

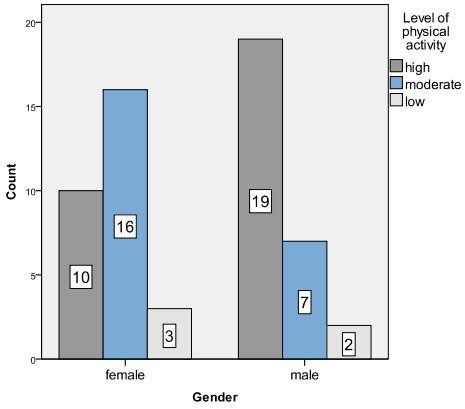

Chart no. 9. Gender and the level of physical activity

Most of the participants, 23 out of 57, declared that their actual fitness level is lower than it was in the previous year, 15 of them have the same fitness level, while 16 of them consider that they are more physically active than the year before (Chart no. 10). There is not a statistically significant difference at the level of gender and the actual fitness level respecting the previous year ($\chi^2 = 5.43$, df = 3, p= .142).

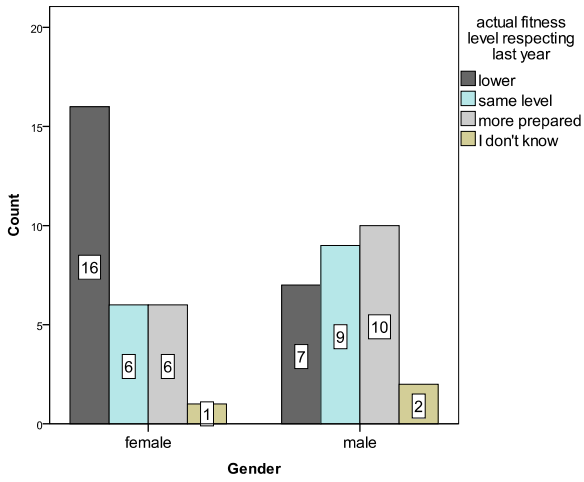

Chart no. 10. Gender and actual fitness level respecting last year

Discussions

In some previous studies there were recommendations on how a person could stay physically active by exercising at home, following on-line fitness programs and how to avoid extended hours of sitting and a sedentary behavior (Woods et al., 2020, p. 62).

In a different study the authors sustain that the main way of being active during the period of lock down was by doing sports activities at home, offering few examples of vigorous activities like carrying loads up and down the stairs (Maugeri et al., 2020, p.6).

In another study it was measured how the physical activity level is affected by the Covid-19 pandemic period. The results evidenced that the level of physical activity have generally decreased moreover at the level of boys, one of the reason was because they have been involved in organized sports activities before restrictions and during pandemic those activities were suspended (Sekulic et al., 2020, p. 11)

If we intend to continue our study, there is necessary to increase the number of participants and also to find/create instruments for measuring how people/youth migrate from a sport activity to another.

Conclusions

The majority of participants involved in this study, more exactly 18 of them are included in the overweight category, meanwhile 23 women out of 29 have normal weight. The result could be influenced by the fact that men have more muscular mass achieved by practicing different sports activities when they were younger.

Participants of this study stated that they usually spend 30-40 minutes of vigorous physical activities, meanwhile, they spend one hour for moderate physical activities.

Some of the participants, 14 of them who were involved in this study spent 6 hours sitting, and this sedentary behavior could affect their state of health.

The most part of those involved in this study, 29 of them, are included in the category of high physical activity level, the majority of them being male. In the category of moderate activity level, we have 23 people, 16 of them are female. There is also a statistically significant difference at the level of genders and physical activity level.

Considering their perception about personal fitness level in comparison to the previous year, 23 of the participants in this study have declared that their fitness level decreased. Therefore, the pandemic situation have also affected their habits concerning sports activities.

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YOUTH TENNIS PLAYER SERVES ACCURACY WITH RESPECT TO DIFFERENT RACKETS VARIATIONS

GHERŢOIU DAN MIHAI[1,*], MOCA COSMIN MIHAI[1]

ABSTRACT. Introduction. Historically, biomechanics research has examined discrete kinematics, however there is now a general appreciation that tennis racket weight, size and sweet-spot vibration play equally important roles in the execution of assorted movement skills in youth players. **Objective.** The aim of this paper was to determine if young tennis players can accurately perform a tennis serve with altered forms of their preferred rackets. **Materials and Methods.** The participants in this study were young tennis players (N = 12), males, with the ages between 14 and 15 years old. **Results.** There was a significant difference in the scores for weighted and threaded rackets for both the left-to-right and right-to-left serve directions. **Conclusion.** Our study managed to show that a different kind of racket can affect the serving accuracy in youth tennis players.

Keywords: *tennis, accuracy, youth, equipment, serving.*

REZUMAT. ***Acurateţea serviciului în tenis la jucători tineri în funcţie de rachetă*****. Introducere.** Istoric, cercetările din biomecanică au examinat particularităţi ale mişcării dar acum există un consens că particularităţile rachetei de tenis au un rol la fel de important în execuţia procedeelor tehnice la jucătorii tineri. **Obiective**. Scopul acestei lucrări este de a vedea dacă jucătorii tineri de tenis pot să servească cu acurateţe cu o rachetă diferită de cea preferată. **Material şi metode.** Participanţii în acest studio au fost jucători tineri de tenis (N=12), băieţi cu vârsta între 14 şi 15 ani. **Rezultate**. S-a observat o diferenţă semnificativă pentru rachetele diferite atât pentru serviciile stânga-dreapta cât şi pentru cele dreapta-stânga. ***Concluzii*****.** Studiul nostru a reuşit să arate că tipuri diferite de rachetă pot influenţa acurateţea serviciului la jucătorii tineri de tenis.

Cuvinte cheie: *tenis, acurateţe, tineri, echipament, serviciu in tenis.*

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Introduction

Historically, biomechanics research has examined discrete kinematics, however there is now a general appreciation that tennis racket weight, size and sweet-spot vibration play equally important roles in the execution of assorted movement skills in youth players (Bartlett, Wheat, & Robins, 2007). Despite the apparent mechanical disparity between these equipment options, their critical end-point parameters, such as trajectory, as well as release speed and projection angle of the ball displayed variations. There is also some evidence to suggest that coupling perception and action may augment the adaptation process. In other words, external information is used as a reference against which players continuously calibrate their mechanics to ensure that desired end-point parameters are consistently attained. The high consistency of the end-point parameters infers that these are the critical aspects of projectile skills, whose impropriety may compromise task success. Indeed, a consistent projection angle and release speed is considered critical to the successful execution of tennis strokes (Knudson & Blackwell, 2005). Therefore, serve success is expectedly contingent on a consistent projection angle and ball speed, while at the same time dependent on repeatable sensory adaptation to equipment.

Designing effective sports tasks and competitions for young players is a complex process where many factors interact in learning functional skills and behaviours (Chow et. al., 2016; Renshaw et. al., 2010). Therefore, the design of adequate learning environments must be supported by a robust theoretical framework that understands the complexity of learning movement skills in which the environment and players interact (Correia et. al., 2019; Newell, 1986). One pedagogical and coaching principle states that through the manipulation of constraints, one can shape the exploration and acquisition of different movement patterns owing to the self-organization process inherent in human movement systems (Chow et. al., 2016; Renshaw et. al., 2010; Newell, 1986; Passos et. al., 2008). These constraints were classified in three different categories: "performer constraints" are the physical attributes (height, weight and body composition); "environmental constraints" are of a physical nature (light, temperature) or social (peer groups, coaches, parents); and "task constraints", which include game rules, sport equipment (balls, nets, rackets), playing areas, number of players and information sources specific to each sport context (Ranganathan & Newell, 2013).

Studies grounded in nonlinear pedagogy and the constraints-led approach highlight constraints manipulation (especially task and environment constraints) as a powerful principle because of their significance in learning (Correia et. al., 2019). In this sense, an effective modification of task or environment constraints could influence the player's intention to explore functional movement patterns

and decision–making behaviours to help them solve problems in a real context (Oppici et al. 2017). In summary, appropriately modifying task constraints (rules, playing spaces, sports equipment) can improve the learning opportunities afforded in ecological environments, promoting movement variability and creativity (Brocken et. al., 2020).

Objectives

The aim of this paper was to determine if young tennis players can accurately identify the location of their tennis serve with altered versions of the rackets they use.

Methods

Subjects

The participants in this study were young tennis players (N = 12), all males, with the ages between 14 and 15 years old.

Methods and the Steps of the Research

For the purpose of this study three tennis rackets variations were used (for each type handled by the subjects): normal (no modifications), weighted (small weights were used to change the tilt of the racket) and threaded (changed sweet-spot). To minimize the number of variables, only one type of tennis balls was used (official balls approved by the ITF (International Tennis Federation)).

Each subject had to serve from the baseline from left-to-right direction, and also from right-to-left direction. They were required to execute sets of 2 serves (as it would happen in a match) until they were able to achieve 2 consecutive serves that would land in the predetermined location (a square of 6 cm by 6 cm at the upper left and right corners of the serving halves). They had 1 minute break between each set of 2 serves where they were allowed to hold the racket but not to play with a ball. The type of serve curvature, style or effect was left completely at the subject's decision. We quantified the number of serves required to reach the 2 consecutive ones (excluding them). The data was collected and analysed using SPSS 17b.

Results

After the tests were finished, we've collected the following data for each subject and for each background tested.

Table 1. Number of serves required for each subject for each racket type for the left-to-right direction

	Boys Left-to-Right		
Subject	Normal_Racket	Weighted_Racket	Threaded_Racket
1	8	9	5
2	7	8	6
3	9	8	5
4	5	7	6
5	5	8	7
6	4	7	7
7	7	8	5
8	7	9	5
9	6	8	7
10	5	7	4
11	9	7	5
12	9	7	4

Table 2. Number of serves required for each subject for each racket type for the right-to-left direction

	Boys Right-to-Left		
Subject	Normal_Racket	Weighted_Racket	Threaded_Racket
1	7	8	4
2	6	7	5
3	8	7	4
4	4	6	5
5	4	8	7
6	4	7	7
7	8	8	6
8	8	9	6
9	7	8	7
10	5	8	5
11	9	7	7
12	9	8	5

Table 3. Mean, Standard deviation and standard error mean calculated for each pair of rackets for the left-to-right direction

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Normal_LtR	6.75	12	1.765	.509
	Weighted_LtR	7.75	12	.754	.218
Pair 2	Normal_LtR	6.75	12	1.765	.509
	Threaded_LtR	5.50	12	1.087	.314
Pair 3	Weighted_LtR	7.75	12	.754	.218
	Threaded_LtR	5.50	12	1.087	.314

Table 4. Mean, Standard deviation and standard error mean calculated for each pair of rackets for the right-to-left direction

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Normal_RtL	6.58	12	1.929	.557
	Weighted_RtL	7.58	12	.793	.229
Pair 2	Normal_RtL	6.58	12	1.929	.557
	Threaded_RtL	5.67	12	1.155	.333
Pair 3	Weighted_RtL	7.58	12	.793	.229
	Threaded_RtL	5.67	12	1.155	.333

Table 5. Mean, Standard deviation and standard error mean calculated for each pair of the same racket for the left-to-right and right-to-left direction

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Normal_LtR	6.75	12	1.765	.509
	Normal_RtL	6.58	12	1.929	.557
Pair 2	Weighted_LtR	7.75	12	.754	.218
	Weighted_RtL	7.58	12	.793	.229
Pair 3	Threaded_LtR	5.50	12	1.087	.314
	Threaded_RtL	5.67	12	1.155	.333

Table 6. Paired sample t-test for each pair of rackets for the left-to-right direction

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Normal_LtR - Weighted_LtR	-1.000	1.758	.508	-2.117	.117	-1.970	11	.074
Pair 2	Normal_LtR - Threaded_LtR	1.250	2.563	.740	-.378	2.878	1.690	11	.119
Pair 3	Weighted_LtR - Threaded_LtR	2.250	1.288	.372	1.432	3.068	6.051	11	.000

Table 7. Paired sample t-test for each pair of rackets for the right-to-left direction

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Normal_RtL - Weighted_RtL	-1.000	1.809	.522	-2.149	.149	-1.915	11	.082
Pair 2	Normal_RtL - Threaded_RtL	.917	2.392	.690	-.603	2.436	1.328	11	.211
Pair 3	Weighted_RtL - Threaded_RtL	1.917	1.311	.379	1.083	2.750	5.063	11	.000

Table 8. Paired sample t-test for the two serve directions on the same racket

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Normal_LtR - Normal_RtL	.167	.835	.241	-.364	.697	.692	11	.504
Pair 2	Weighted_LtR - Weighted_RtL	.167	.718	.207	-.289	.623	.804	11	.438
Pair 3	Threaded_LtR - Threaded_RtL	-.167	1.030	.297	-.821	.488	-.56	11	.586

A paired-samples t-test was conducted (Table 6) to compare successful marks between weighted and threaded rackets during the serves from left to right. There was a significant statistical difference in the scores for weighted racket (M=7.75, SD=0.754) and threaded racket (M=5.5, SD=1.087) conditions during the left-to-right direction; t(11)=6.051, p = 0.000. This means that the change of racket type from weighted to threaded has an influence over the accuracy of the subjects' serve.

A paired-samples t-test was conducted (Table 7) to compare successful marks between weighted and threaded rackets during the serves from right to left. There was a significant statistical difference in the scores for weighted racket (M=7.58, SD=0.793) and threaded racket (M=5.67, SD=1.115) conditions during the left-to-right direction; t(11)=5.063, p = 0.000. This means that the change of racket type from weighted to threaded has an influence over the accuracy of the subjects' serve.

The other paired sample t-tests performed for either another racket variation or direction of serve didn't show any important statistical difference.

Conclusion

Our study managed to show that there is an important difference between the serving accuracy between weighted and threaded racket variations. This may indicate that there is a need for more reaction training on either weighted or threaded rackets to be able to adapt to different playing conditions. This result may also indicate that training on either weighted or threaded rackets may affect the accuracy of the serve when changing to the other racket type.

These results may point towards the idea that tennis players must train their accuracy according to the type racket they will play with. The fact that there was no significant difference between normal racket and the rest may indicate that training done on normal doesn't affect the accuracy of the serve on the other rackets.

There was no significant difference between the accuracy of the two directions tested. Left to right serve and right to left serve directions means were almost the same for all three racket variations.

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THE INFLUENCE OF HARMONIC GYMNASTICS ON FLEXIBILITY, DYNAMIC BALANCE, HEALTH AND WELL-BEING OF OLDER ADULTS: A PILOT RESEARCH

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ABSTRACT. Background. Physical activity (PA) is highly recommended for older adults in order to improve physical functioning, health and well-being. **Aims.** The purposes of this pilot research were: to investigate the influence of Harmonic Gymnastics (HG) on flexibility, dynamic balance, health and well-being of older adults, and to verify the feasibility of the research tools. **Methods.** In this pilot research 15 healthy men and women, mean age 58.7 (6.5), from Tel Aviv, Israel, volunteered to participate in the research program, which included 50 min. of HG practice, three times a week, for six weeks. Three questionnaires – SF-36 Health and quality of life questionnaire, The Global Physical Activity Questionnaire (GPAQ) and the Mindfulness Awareness Assessment Scale (MAAS) – and two physical skills testing equipment – Y Balance Test (YBT) and the Back Saver Sit and Reach test (BSSR) – were used to assess the subjects. **Results.** Post-test results showed significant improvements of total score of health and well-being by SF-36 ($p < 0.05$) and body awareness by MAAS ($p < 0.0001$), but no significant results for SF-36 (0.0629) subscales nor for the global PA measured by GPAQ ($p = 0.391$). Participants improved hamstring flexibility ($p < 0.05$) and dynamic balance of right leg ($p < 0.001$) and left leg ($p = 0.00001$). C**onclusions.** This pilot research indicates the feasibility of YBT, BSSR, MAAS and SF-36. HG was found to be tailored for older adults. Older adults improved functioning capabilities, body awareness, health and well-being after the program.

Keywords: *harmonic gymnastics, older adults, flexibility, dynamic balance, health and well-being.*

REZUMAT. ***Influența gimnasticii armonice asupra mobilității, echilibrului dinamic, sănătății și stării de bine a persoanelor în vârstă: o cercetare pilot.*** **Introducere.** Activitatea fizică (AP) este recomandată adulților în vârstă pentru

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a-şi îmbunătăţi funcţionarea fizică, sănătatea şi starea de bine. **Obiective**. Scopurile acestei cercetări pilot au fost: investigarea influenţei gimnasticii armonice (HG) asupra flexibilităţii, echilibrului dinamic, sănătăţii şi stării de bine a vârstnicilor şi verificarea fezabilităţii instrumentelor de cercetare. **Metode.** În această cercetare pilot, 15 bărbaţi şi femei sănătoşi, cu vârsta medie 58,7 (6,5), din Tel Aviv, Israel, s-au oferit voluntari să participe la programul de cercetare, care a inclus 50 de minute. de practică HG, de trei ori pe săptămână, timp de şase săptămâni. Trei chestionare – SF-36 Chestionar privind sănătatea şi calitatea vieţii, Chestionarul global de activitate fizică (GPAQ) şi Scala de evaluare a conştientizării atenţiei (MAAS) – şi două echipamente de testare a abilităţilor fizice – Testul de echilibru Y (YBT) şi Back Saver Sit and Reach Test (BSSR) – au fost utilizate pentru a evalua subiecţii. **Rezultate.** Rezultatele post-test au arătat îmbunătăţiri semnificative ale scorului total de sănătate şi stare de bine ($p < 0,05$) şi conştientizarea corpului de către MAAS ($p < 0,0001$), dar nu s-au obţinut rezultate semnificative pentru subscalele SF-36 (0.0629) şi nici pentru PA globală măsurată prin GPAQ ($p = 0,391$). Participanţii şi-au îmbunătăţit flexibilitatea hamstring ($p < 0,05$) şi echilibrul dinamic al piciorului drept ($p < 0,001$) şi piciorului stâng ($p = 0,00001$). **Concluzii**. Această cercetare pilot indică fezabilitatea YBT, BSSR, MAAS şi SF-36. S-a constatat că HG este adaptat pentru adulţii în vârstă. Adulţii mai în vârstă au îmbunătăţit capacităţile de funcţionare, conştientizarea corpului, sănătatea şi bunăstarea după program.

***Cuvinte cheie**: gimnastică armonică, adulţi în vârstă, flexibilitate, echilibru dinamic, sănătate şi bunăstare.*

Introduction

In addition to utility, abundance, physical health and meaningful life, it appears that all approaches agree on functional capability as a key component of the quality of life (Nussbaum & Sen, 1993). Steptoe, Deaton & Stone (2015) have found that a happy person with a positive life also succeeds in life and has better health components. They have found that the predictors of low levels of well-being were: male sex, single males, low income, obesity, diseases such as stroke, smoking, and physical activity (PA). Of all components of life style, PA had the strongest relationship with well-being and quality of life (Steptoe, Demakakos, de Oliveira, & Wardle, 2012; Steptoe, Deaton & Stone, 2015).

Many researchers of recent years have shown that, the decline in physiological, cognitive, and mental abilities in older age and the tendency to a sedentary lifestyle may cause a decline in physical functioning, well-being and quality of life in the elderly. PA was found to improve physiological, social,

cognitive and mental health components. Additionally, it was found also to reduce the risk of chronical and neurological diseases (Adlard, Perreau, Pop, Cotman & Neurosci, 2005; Bangsbo et al., 2019; Schmidt et al., 2015; Reiner, Nierman, Jekauc & Woll, 2013; Ross, Hudson, Stotz & Miu Lam., 2015; Stodden et al., 2008).

Therefore, it would be interesting to better understand the type of physical activity that would benefit older adults, and the specific skills older adults should practice for better health and well-being. Balance was found to be a crucial capability for independent functioning, since older adults tend to have lower postural control and are at higher risk of falls (Cohen, Nutt & Horak, 2011; Hasegawa et al., 2016; Hsiao et al., 2018). Flexibility was also found to be connected to reduced pain, stress and tension, and increased posture control, body symmetry, self-regulation and sleep quality (Alter, 2004; Sadler, Spink, Ho, de Jonge & Chuter, 2017; Tekur, Singphow, Nagendra & Raghuram, 2008). Researchers have also emphasized the need for a tailored PA for older adults and recommended to work on coordination and the quality of movement (Schwickert et al., 2016; Skelton & Dinan, 1999). This pilot research is conducted in order to investigate the influence of HG on posture control, balance, flexibility, health and well-being and to verify the feasibility of back saver sit and reach (BSSR), Y balance test (YBT), SF-36 questionnaire, mindfulness attention awareness scale (MAAS) and the global PA questionnaire (GPAQ) for older adult's population.

Material and methods

In this pilot research fifteen healthy adults, three men and twelve women from Tel Aviv, Israel, ages 47-71 volunteered to participate in the research program and signed a consent form of ethical approval. Participants had not practiced any organized physical training for at least one year prior to the program. The intervention program included 50 minutes' sessions of HG, three times a week for six weeks in total.

Harmonic Gymnastics intervention program contained a low intense physical activity that is focused on strengthening the body muscles and joints, postural alignment, posture transitions, coordination, proprioceptive and vestibular ability in addition to attention and body awareness.

Participants answered three questionnaires: SF-36 Health and quality of life questionnaire, The Global Physical Activity Questionnaire (GPAQ) and the Mindfulness Awareness Assessment Scale (MAAS). They were also assessed by two physical ability tests: dynamic balance by Y Balance Test (YBT) and low back and hamstrings flexibility by the Back Saver Sit and Reach test (BSSR).

Pilot research tools

SF-36 Health and quality of life questionnaire (Version 1.0) USA.

The MOS 36-item short-form health survey by Ware and Sherbourne (1992), is a valid and reliable questionnaire, that focuses on physical functioning and role limitation due to physical health, vitality (energy/fatigue), pain and general health, social and emotional well-being (Ware & Sherbourne, 1992; Ware & Gandeka, 1998).

Global Physical Activity Questionnaire (GPAQ)

The Global Physical Activity Questionnaire measures the amount of physical activity of people in different countries. It collects information on physical activity participation at work, in everyday traveling from place to place and in recreational activities. It was developed by WHO and comprises 16 questions (P1-P16). This questionnaire considers the daily energy expenditure measured by METs (Metabolic Equivalents) in sedentary activity (is equivalent to 1 MET), moderate PA (4METS), and 8 Mets for intensive PA (WHO, 2019).

Mindfulness Awareness Attention Scale (MAAS)

The 15-item MAAS was designed to assess a core characteristic of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present.

Back Saver Sit and Reach test (BSSR)

This is a practical, valid and reliable physical test that is mostly assigned to measure hamstrings muscle's flexibility capability. In Back Saver Sit and Reach test the subject has to place one leg standing on a mat with bended knee while the other leg remains straight.

Y Balance Test (YBT)

The YBT is a valid and reliable tool to measure dynamic balance and the neuromuscular ability to maintain equilibrium of the body and coordination. It measures the anterior/ posterior direction (AP), the posterior -medial direction (PM) and the posterior lateral direction (PL) while standing on one leg and pushing the cube with the other leg (Neves, 2017).

Results

Table 1. Sample Characteristics

Variable	Overall
N	15
Gender N (%)	F 12 (80.0) / M 3 (20.0)
Education N (%)	Academic 11 (73.3) / High School 4 (26.7)
Age – years (mean (SD))	59.2 (6.4)
BMI – kg/m^2 (mean (SD))	28.5 (5.4)

The characteristics of the subjects are presented in Table 1: 15 subjects were included in this study – twelve women (80%) and three men (20%) – 11 of them (73.3%) with academic education and 4 (26.7%) with high school education, from Tel Aviv, Israel; subjects' mean age was 59.2 (6.4) and BMI mean value was 28.5 (5.4), value that indicates a situation of overweight (WHO, 2000).

Table 2. Mean comparison of pre-test and post-test of questionnaires (N=15)

Questionnaire	Pre-test Mean (SD)	Post-tests Mean (SD)	SMD	p	Size Effect
MASS	67.41 (10.84)	76.69 (20.10)	-9.28	<0.0001	2.3
GPAQ	582.65 (776.79)	736.67(767.83)	-154.02	0.3081	0.89
SF36 Total	66.42 (16.73)	74.70 (9.91)	-8.28	0.0353	2.39
SF36 PF	74.33 (17.20)	81.67 (8.80)	-7.33	0.0629	2.01
SF36 EWB	63.11 (14.77)	65.67 (15.43)	-2.56	0.3793	0.66
SF36 sf	75.00 (27.14)	79.50 (20.49)	-4.5	0.5515	0.72

*Note: SF36 subscales are: PF-Physical functioning, EWB-Emotional Well Being, sf is Social Functioning. p is p-value based on Paired Wilcoxon test.

In Table 2 we can see statistical analysis of three questionnaires. Significant improvements were observed in attention and body awareness measured by MAAS ($P < 0.0001$), and in the total score of health and well-being measured by SF- 36 ($p = 0.0353$). Borderline significance for physical functioning (0.0629) subscale of health and well-being SF-36 questionnaire, and no significant differences for emotional and social well-being ($p = 0.3793/0.5515$). No significant changes for the global PA measured by GPAQ ($p=0.3081$) were observed. The highest size effect was seen in SF36 total (2.39) and physical functioning (2.01) scores and in MAAS (2.3) whereas in GPAQ and SF36 emotional and social health scores insignificant size effect.

Table 3. Mean comparison of pre-test and post-test of BSSR (N=15)

	Pre-test Mean (SD)	Post-test Mean (SD)	SMD[a]	P[b]
BSSR	11.02 (5.73)	18.82 (7.20)	-8.2	0.0013

*Note: a. SMD is the Standardized Mean Difference. b. P is p-value based on Paired t-test

Table 3. shows significant improvements in hamstrings' flexibility and lower back muscles from 11.02 (5.73) cm. to mean value of 18.82 (7.20) cm. after program (p= 0.0013), as was measured by BSSR.

Regarding dynamic balance and the neuromuscular ability to maintain equilibrium of the body and coordination, measured by Y Balance Test (YBT), Table 4 presents significant improvements in right leg scores in all directions (AP/PM/PL) and significant improvements by composite scores (p =0.001). Significant improvements in left leg scores in all directions and also by composite score (p =0.00001). The differences between legs (Delta) were smaller in all directions. Significant improvements were found only on PM (p = 0.042) and borderline on PL (0.068).

Table 4. Mean comparison of pre-test and post-test of YBT (N=9) [a]

YBT	Pre-test Mean (SD)	Post-test Mean (SD)	SMD[b]	P[c]
Right leg AP	36.30 (13.76)	60.72 (9.31)	-23	0.000781
Right leg PM	51.98 (21.39)	86.84 (10.08)	-30.9	0.0019
Right leg PL	47.75 (21.42)	85.88 (11.16)	-35.6	0.00082
Right leg composite	45.34 (18.58)	77.82 (9.07)	-29.8	0.00102
Left leg AP	32.12 (14.20)	59.08 (9.23)	-26.9	0.00127
Left leg PM	44.00 (19.65)	86.18 (11.90)	-43.9	0.00027
Left leg PL	46.06 (24.22)	82.38 (13.11)	-38.9	0.000273
Left leg composite	40.72 (18.32)	75.88 (10.43)	-36.6	0.00001
Delta AP	8.54 (8.00)	5.31 (6.33)	1.7	0.63891
Delta PM	14.59 (11.36)	4.72 (3.59)	8.5	0.04202
Delta PL	17.76 (13.78)	5.75 (4.51)	9.5	0.06842
Delta composite	12.14 (11.06)	3.64 (3.83)	6.2	0.14898

*Note a. six subjects who failed the pretest were excluded b. SMD is the Standardized Mean Difference. b. P value is based on paired t-test. AP is anterior- posterior direction; PM is posterior - medial direction; PL is posterior - lateral direction; Delta indicates the difference between legs Right-Left legs.

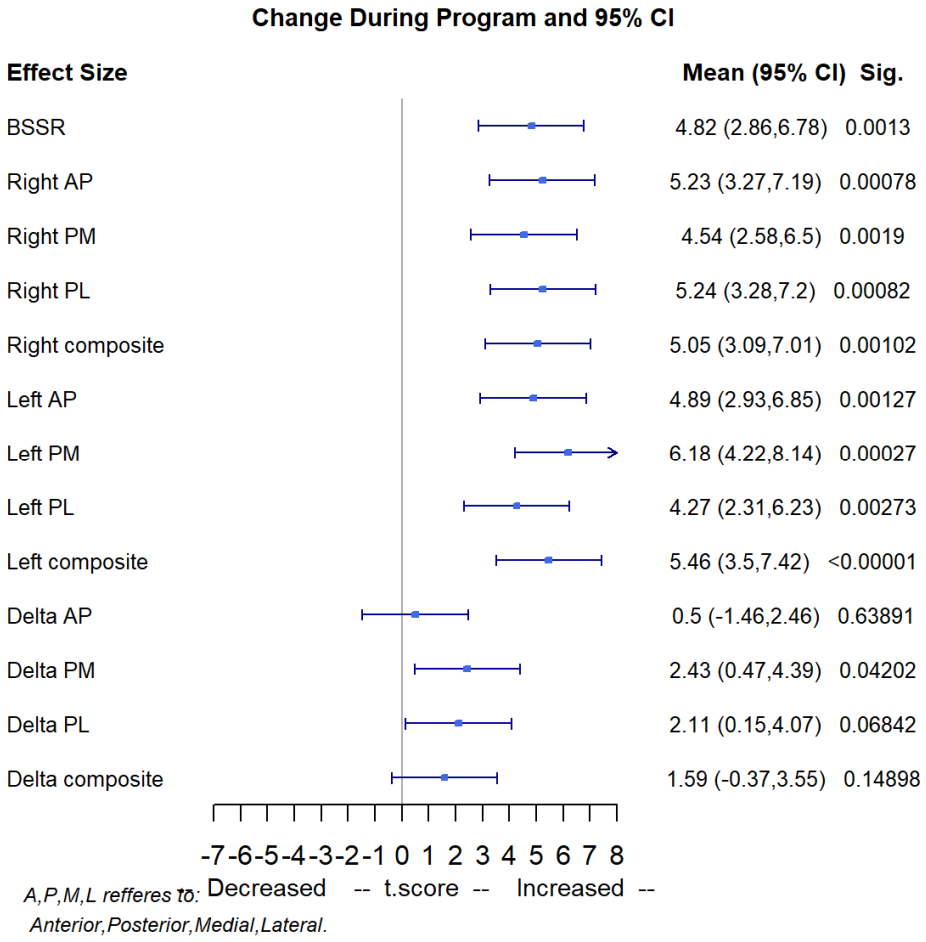

Fig. 1. Forest plot of BSSR and YBT size effect

Fig. 1 shows the forest plot of size effect of HG on capability variables. The forest plot shows positive size effect on flexibility (4.82), left leg of dynamic balance test in PM direction (with highest score effect of 6.18), in AP (4.89) and PL (4.27) directions as well. In right leg the highest size effect was in AP (5.23) and PL (5.24), while in PM 4.54. In composite scores size effect was 5.05 in right leg and 5.46 in left leg. Size effect of the difference between legs (Delta), was positive but generally the smallest of all: 2.43 in PM, 2.11 in PL, and only 0.5 in AP. Size effect of composite Delta score was 1.59.

Discussion

The results of this pilot research revealed significant improvements in health and capabilities measured: dynamic balance, hamstrings flexibility, body awareness, and total score of health and well-being. HG was found to be a tailored and beneficial PA program for older adults.

Flexibility of hamstrings muscles significantly improved ($p = 0.0013$) in addition to health and well-being especially in physical functioning ($p < 0.05$).

These results are in line with Alter (2004), Sadler, Spink, Ho, de Jonge & Chuter (2017) and many researchers who have found that tightened hamstrings muscles restrictions and lumbar lordosis movement are related to low back pain and restricted functioning. These results are also in line with other low intensive intervention programs such as Yoga, breathing and meditation practice and proprioceptive exercises, which improved flexibility, dynamic balance and health components (Kellis & Kofotolis, 2006; Tekur, Singphow, Nagendra & Raghuram, 2008).

The results of this pilot research indicate that flexibility exercises didn't come at the expense of muscle's strength. Dynamic balance ability test which is supported among other abilities by muscle strength, was also improved ($p =/< 0.01$). Lee, Kang, Lee & Oh (2015), who investigated older women (ages 45-80), have found that YBT is significantly and positively related to lower limb strength. Moreover, it is well known that athletes who tend to be injured are characterized by tightened and weaker muscles (Jonhagen, Nemeth & Eriksson, 1994), and recommendations are to flex and strengthen the muscles in order to prevent injuries and increase muscles' ability (Worrell & Perrin, 1992).

Baseline scores of YBT in this pilot study are relatively low and averaged 45.34 (18.58) for right leg and 40.72 (18.32) for left leg, and the differences revealed composite score of 12.14 (11.06) cm. Six subjects failed the test before the intervention program. These findings are in line of other researcher's findings. Older adults revealed poorer results in YBT and other similar balance and coordination tests (Cosio-Lima et al., 2016; Smith, Chimera & Warren, 2015; Gorman, Butler, Kiesel, Underwood & Elkins, 2009; Teyhen et al., 2014). In fact, Plisky et al. (2009) have found that composite scores below 94% and difference between legs of more than 4 cm. indicate instability of the ankle, deficit in dorsi-flexion in the sagittal plane and lower musculoskeletal control of lower limbs.

In addition, there is a large scale of variance within group. This test is usually applied to athletes or younger population. Older adults in this pilot although healthy did not reach good results at baseline test (Gupta, Yangdon, Gupta & Kumari, 2016), but after intervention program, subjects significantly improved YBT scores in all directions ($p =/< 0.001$). Only two subjects failed

after program compared to six subjects before program, and the difference between the two legs was reduced from 12.14 (11.06) to 3.64 (3.83), which is less than four cm. and as was indicated above, this result is related to lower risk of falling and injuries.

The pilot research shows us that dynamic balance improved as well as total score of health and well-being ($p < 0.05$). these results are in line with Tsigkanos, Gaskell, Smirniotou & Tsigkanos (2016), who have found that people with low back pain had greater postural sways. They concluded in their study that dynamic and static balance are strongly connected to low back pain whereas dynamic balance ability had greater impact on low back pain.

Health and well-being measured in this research by the SF-36 revealed high mean score of 67.6 (16.8) which is best health (60. +). Subjects of this pilot study were highly educated. Eleven of them (73.3%) were academically educated and four of them (26.7%) finished high school. They are from neighbourhoods in north Tel Aviv Israel, characterized by well-educated people with high- income. These results are in line with Kahneman & Deaton (2010) who showed that higher educational levels increased the subjective well- being and quality of life, and low income was associated with lower life evaluation and lower emotional well-being.

Subjects of this pilot study improved total health and quality of life questionnaire's score from 66.42 (16.73) total mean score to 74.70 (9.91) after program ($p < 0.05$), but no significant improvements on separate health sections especially in emotional well-being (EWB) and social functioning (SF). Lins & Carvalho (2016), indicated that it would be inappropriate to determine one single score that would reflect a person's entire health score. Since this questionnaire includes physical, mental and social components, these should be calculated separately (Lin & Woollacott, 2002). Sectional components of health and well-being improved after program, but not significantly. The fact that it was not significant may have been related to the relatively high baseline scores, or to the fact that the sample was rather small.

Mindfulness Attention Awareness Scale significantly improved after the program ($p <0.0001$). HG program included mindfulness practice. Trainees were requested to pay attention to their bodily reactions and leaning positions, while moving and while resting and after the exercises. Attention is directed to the rhythm, the power and weight, the course and the direction of the movement. In HG there is also considerable reference to the breathing process and to the "here and now" space, as practiced in mindfulness training.

These results are in line with recent findings of mindfulness practice. Mindfulness has been discovered to act as a stress protector for older adults (de Frias & Whyne, 2015), and pain redactor (Banth & Ardebi, 2015). Poulin et al.

(2016), have found that acting in awareness had a great impact on pain reduction, mental health and quality of life. Results of this pilot research encourage to combine mindfulness practice in physical activity training and emphasize its importance, especially in older ages (Poulin et al., 2016).

GPAQ was not been changed in the light of HG intervention program. This is a low intensive program. Most exercises are practiced in a supine position, some in sitting position and some standing. This training is not intended to improve cardiovascular endurance. It is directed at improving posture and coordination skill that may affect the quality of movement rather than the quantity of physical activity. Its positive influence on physical capabilities and health may encourage older adults to participate in various activities, including moderate and intensive type of PA in the long term.

Conclusions

Harmonic Gymnastics program has been found to be tailored for older adults. Subjects in this pilot research participated successfully in the program and improved their flexibility, dynamic balance, body awareness and total score of health and well-being. No significant changes for health and well-being were found in questionnaire's subscales. Emotional and social health were not significantly improved and physical health was border line ($p= 0.064$). In addition, HG did not change the global physical activity (GPAQ) of older adults. This pilot research indicates the feasibility of measuring dynamic balance by YBT, flexibility by BSSR, body awareness by MAAS and health and well-being by SF-36 for older adults.

Recommendations

Following this pilot research, it would be recommended to implement a long-term research program consisting of 6-12 months of HG intervention program for older adults, with a larger sample that could be divided by age groups and with original tools. It is recommended to compare HG program with other physical activity programs such as a regular gym intervention program of muscles' strengthening or aerobic physical intervention program as a control group. GPAQ should be measured at least 6 months after HG long-term intervention program in order to investigate whether older adults will participate in more physical activities in their everyday life following the practice of HG.

Limitations

This is a pilot research with a small sample (n=15). The range of ages varied from 47 years old to 71 years old. Because of small sample size it was impossible to divide them by age groups. The duration of this research was too short for solid conclusions.

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CONFLICT MANAGEMENT WITHIN TRANSYLVANIA COLLEGE INTERNATIONAL SCHOOL

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ABSTRACT. The conflict has always been an inevitable progress and it existed since our earliest times whenever there was a desire to lead a group or even an empire. For this theme we took into account the fact that the term "conflict" has a negative connotation and it is often associated with concepts such as anger, aggressivity, opposition, although conflict doesn't necessarily need to be referred to as a negative experience. We must acknowledge the fact that if we experience conflicts in our lives, it means we are sincere, we express our visions, opinions, thoughts and feelings, and that, in this way, we can evolve and develop as humans. The objectives of the research within the international school Transylvania College Cluj-Napoca were to analyse the types of conflicts and what caused them within the organisation, the people who offered support to solve these conflicts and the number of conflicts each teacher had. For the research we used a survey where 37 teachers (males and females) replied to several questions in a google form at the end of the 2018 - 2019 academic year and where the responders had difficulties the researchers offered additional explanations by email or verbally. The study concluded that conflicts are not created because of the difference in objectives, but from the difference in how the parties involved want to achieve these objectives and the most common of the conflicts was definitely when people didn't express clearly what they wanted or gave unclear instructions. Furthermore, a clear communication reduces the differences in perception and the probability of a conflict.

Keywords*: conflict, objectives, management, leader.*

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REZUMAT. ***Managementul conflictelor în cadrul Şcolii Internaţionale Transylvania College.*** Conflictul este un proces organizaţional inerent, acesta a existat şi există din cele mai vechi timpuri din dorinţa de a conduce, de a fi liderul unui grup sau al unui imperiu. În abordarea acestei teme am pornit de la premisa că termenul de conflict are o puternică conotaţie negativă, evocând cuvinte ca opoziţie, mânie, agresivitate, acesta însă nu trebuie să fie neapărat înţeles ca fiind o experienţă negativă deoarece acest concept dacă apare în viaţa noastră înseamnă că suntem oameni sinceri, care ne exprimăm opiniile şi viziunile, cu ajutorul lui putem evolua şi să ne îmbunătăţim educaţia zilnic. Obiectivele cercetării din cadrul Şcolii Internaţionale Transylvania College Cluj-Napoca sunt de a depista cauzele si tipul de conflicte, persoanele din cadrul organizaţiei care au oferit suport în rezolvarea conflictelor şi numărul de conflicte avute de fiecare cadru didactic. Metoda anchetei a fost folosită în cadrul cercetării, unde un număr de 37 de cadre didactice gen masculin şi feminin au răspuns la finalul anului şcolar 2018-2019 unui chestionar în mod privat cu ajutorul platformei on-line google forms, iar unde au fost întâmpinate dificultăţi s-au oferit explicaţii suplimentare prin email sau verbal. Studiul a concluzionat că, adesea, conflictele nu pornesc de la diferenţe în privinţa obiectivelor sau scopurilor, ci de la modalităţile de atingere a acestora iar cauza cea mai des evidenţiată la răspunsurile primite este neexprimarea clară şi completă a uneia dintre părţi. De asemenea comunicarea precisă reduce diferenţele perceptuale şi scade în acest mod probabilitatea de apariţie a conflictului.

Cuvinte cheie*: conflict, obiectiv, management, lider.*

Introduction

Conflict has always been an inevitable progress in an organisation as Richard H.Hall stated (Manolescu, 2001). Wherever there were people, there were also ideas, values, different styles and standards that can create conflict , therefore there are more things that can cause it, not just one, things like objectives, aims, manners and habits, personalities, competition, aggressivity and many others. According to Armstrong (2007), conflict is a dynamic process in which contradictions, attitudes and manners are continuously changing and influencing each other. Straton (1999) says that the term conflict is used to describe various situations:

- a conflictual state (resource crisis);
- an emoţional individual state (hostility, frustration, agitation, unease or anxiety);
- a cognitive state (acknowledgement of the conflict situation);
- a behavioral state (from passive resilience to declared aggressive resilience without neglecting any secrecy or pettiness, etc.).

Nowaday conflict is seen as something negative within every organisation but this concept should be considered also as a positive thing because it creates situations that lead to evolution or development and organisations that have conflicts are healthy and functional organizations. The recent interactive approach considers conflicts as a necessary thing that shouldn't be avoided. Conflict is encouraged because a peaceful, cooperative and lenient group or team risks to become static and unresponsive and won't react to change, innovation and development (Deaş, 2012).

According to Leigh Thompson the perception of conflicts is described as follows: the real conflict (when the conflict exists and people perceive it as such),the latent conflict (when the conflict exist but people don't acknowledge it), the false conflict (there isn't any real conflict but people feel there is one) or the inexistent conflict (the conflict doesn't exist and people don't perceive it) (Petelean, 2006).

Objectives

The main objective of this research is to find the types of conflicts and the main causes that lead to these conflicts within International School Transylvania College. We will also look at the people who offered support to solve the conflicts within this organisation and the number of such conflicts for a teacher.

Materials and methods

According to Dragnea (2002) the research methodology for the management field is very vast but, for the present paper, the survey has been chosen as the main research methodology with the direct application of a survey. The survey form (see the Annex) created by the authors for the purpose of this research paper's objectives was sent using google forms to every teacher from the institution and, where the responders had difficulties, the researchers offered additional explanations by email or verbally. The survey was conducted within "Transylvania College" in Cluj-Napoca during 03.04.2019 – 31.05.2019. The responders, females and males were teachers for elementary, secondary and high school education. In total, 37 survey forms were filed in by 10 elementary school teachers, 17 secondary school teachers and 10 high school teachers and all participants have given their consent to take part in this survey. The responders teaching experience varies between 1 and 26 years of experience , therefore beginners teachers up to senior teachers.

Results

The results were interpreted in percentages for every question. If we analyse the first two questions that refer to the number of conflicts each teacher had and how often these conflicts occur we noticed that the number of conflicts or conflictual situations is an average one: for the first question *"How many conflicts did you have throughout a year"* (see chart 1), the responses were that 29.7% have had 1 conflict during that year and 24.3% said they had 3 conflicts which lead to the idea that teachers have experienced conflicts within this organisation. For the 2nd question regarding the frequency of these conflicts, 59.5% replied with "sometimes" and 10% of the responders considered they had conflicts "often".

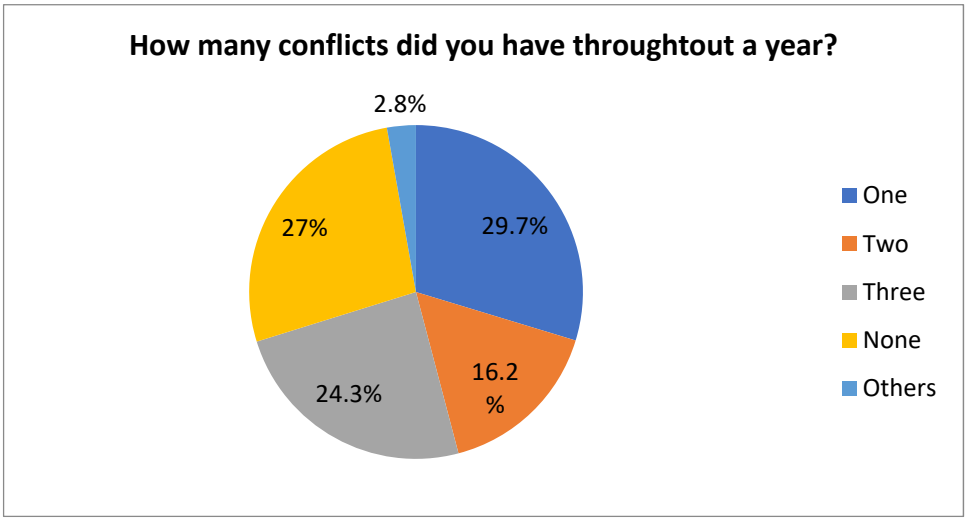

Fig. 1. No of the conflictual situations

Questions 3, 5 and 10 show that there is a high degree of communication and support between colleagues in a department but in the meantime there is plenty of dissent between the same colleagues or colleagues from other departments.

From question number 3 referring to the existence of conflicts and where people find out about these we discovered that there is a good communication between teachers when it comes to finding out about a certain conflict, 40 % of them find out about conflicts from fellow teachers, 45.7% from their department colleagues, 8.6% from their students and the rest of the responders find out about conflicts from their students or their chief of department.

With question number 5 *"Who do you disagree with most?*" authors wanted to find out about the existing relationships within the school and 44.4 % of the teachers said they most disagree with other colleagues from the other departments of the school while approximately a third of them, (27.8%) get into conflicts with colleagues from the same department. It is worth mentioning that 19.4 % of the respondents mentioned that there are conflicts between teachers and their superiors. We also found teachers who don't disagree with anyone or they only get into conflicts with students or the auxiliary staff.

The key to this survey was question no 10 *"Who helped you most to solve a conflict?"* because we wanted to find out who teachers trust when it comes to solving a conflict. From the analysis we found out that usually conflicts are solved hierarchically at the same level – 52.8%, and the school's psychologist has a significant role in solving these situations according to 25 % of the respondents while there is evidence of a small percentage of situations where the members of the school's management solve the conflicts - about 8,3%.

Question no 6 *"Between who and who most conflicts occur?"* got us important results referring to the types of conflicts in this institution. When analysing the answers we found out that conflicts occur between different participants within the school, meaning students, parents teachers, school's management, the school's psychologist and the auxiliary staff. However, most conflicts appear between students - students, teachers- students, parents-teachers, school's management - parents and the school's psychologist and parents. We can conclude that the most conflictual people are the parents in relation with any other category while the teachers tend to have conflicts both with students and parents. Interpersonal conflicts because of the difference between personalities, interests and abilities are the most highlighted ones.

Question no 7 *" What was the cause of the last conflict you had in school ? "* and 8 *" Why do you think there are conflicts in your school ?"* refer to the causes that determined the last conflict the responders had and what causes in general conflicts in the institution. Different visions and misinterpretation are some of the issues that usually cause conflicts. There is a connexion here between teachers of different nationalities who teach different lines of study (Romanian and English). Inevitably, when someone doesn't express themselves clearly or the message is misinterpreted, there's a 50 % chance the situation will lead to a conflict.

Question no. 9 *"From your observations how do conflicts solve in your school? "* and 11 *"How is the relationship between the parties after a conflict has ended?"* shows us that in this institution conflicts are usually solved when both parties meet halfway for 51% of them while for 16% of the teachers a superior is needed to solve the conflict and the rest of the responders replied that the conflict usually ends either when one of the parties gives in or the conflict solves itself. However, after the conflict crisis ends, people still remain resentful so there 's no real solution to solve the conflict.

What we can observe from questions no. 4 *"Do you think the atmosphere in the school is "tensioned"?* (see chart 2) and 12 *"Do you consider this academic year has been difficult?"* (see chart 3) is that there is no connection between the atmosphere in the school and the work related stress.

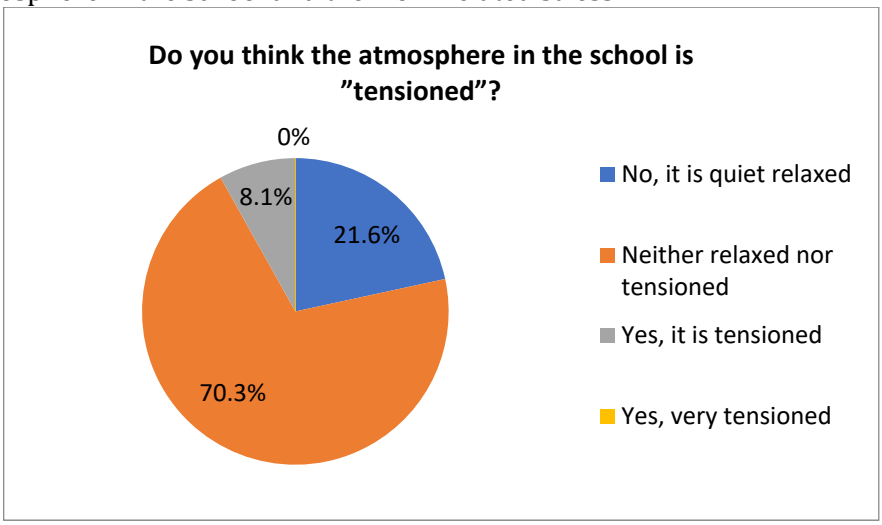

Fig. 2. The atmosphere in the school

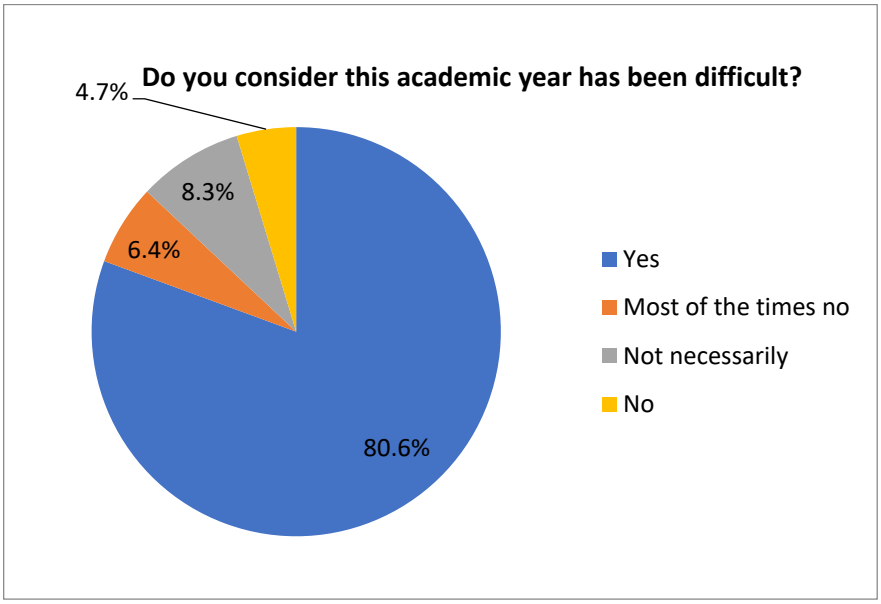

Fig. 3. How stress is felt

80.6 % of the responders considered that the past academic year was stressful from the work point of view but 70.3 % felt that the atmosphere in the school was neither relaxed nor stressful, meaning they considered it appropriate for working.

Conclusions

Within every organisation the ones who create conflicts know what they want and where they want to get but there are situations where the parties involved in the conflict don't have clear objectives and they don't know which way they want to get.

Moreover, it is worth mentioning the fact that, many times, conflicts are not created because of the difference in objectives, but because of the difference in how the parties involved want to achieve these objectives.

From the analysis of the results above we can conclude that conflicts exist in this institution. From the point of view of the parties involved the type of these conflicts is intergroup. If we take in consideration the effects generated by the conflicts we observe that these are predominantly dysfunctional.

The majority of the participants to the research survey said that they can express their opinion, visions, emotions, but the solutions found did not help them to fully solve the conflicts. If we refer to the degree of intensity and duration of the conflicts in this institution the analysis revealed that the conflicts are mixed, spontaneous and acute. If we analysed the conflicts hierarchically we observed that the horizontal type of conflicts between colleagues prevailed.

The most common cause of the conflicts was definitely when people didn't express clearly what they wanted or gave unclear instructions.

By using positive communication and listening empathically one can establish a common path for discussions, interest and sharing common values. Furthermore, a clear communication reduces the differences in perception and the probability of a conflict.

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Annexes

SURVEY

The survey form was completed only by participants who previously agreed to it and the confidentiality of the answers was kept according to the legal procedures.
Please read the following questions and choose the answer that best fits your belief. You can use only one answer for each question.

1. How many conflicts did you have throughout a year ?
   a. One
   b. Two
   c. Three
   d. None
   e. Others .....
2. How often conflicts happen in your school ?
   a. Very often
   b. Often
   c. Sometimes
   d. Rarely
   e. Very rarely
3. Do you know of any conflict in your school ? If you do, where did you find out about it ?
   a. yes, from the students
   b. yes, from the colleagues in my department
   c. yes, from other colleagues
   d. yes, from the chief of department
4. Do you think the atmosphere in the school is “tensioned” ?
   a. No, it is quite relaxed
   b. Neither relaxed nor tensioned
   c. Yes, it is tensioned
   d. Yes, very tensioned
5. Who do you mostly disagree with mostly ?
   a. Colleagues
   b. Department colleagues
   c. Superiors
   d. Subordinates
   e. Auxiliary staff
   f. Others .....
6. Considering the list below, between who and who you think most conflicts occur ?
   a. Students - ……..
   b. Teachers - ……..
   c. Parents - ……..
   d. The school’s management - ……..
   e. The school’s psychologist - ……..
   f. The Auxiliary staff r - ……..

7. What was the cause of the last conflict you had in school ?
   a. Incomplete information to do a certain task
   b. Unclear instructions of a party involved
   c. Inappropriate tone
   d. Confusion of attributions
   e. External factors
   f. Different personal visions
   g. Others .....
8. Why do you think there are conflicts in your school ?
   a. Incomplete information to do a certain task
   b. Unclear instructions of a party involved
   c. Inappropriate tone
   d. Efforts are not appreciated by superiors
   e. Overload of tasks given by superiors
   f. Envy
   g. Subjectivity of colleagues
9. From your observations how do conflicts solve in your school ?
   a. With the intervention of the management
   b. They solve automatically
   c. One of the parties involved gives in
   d. With the intervention of the chief of department
   e. Both parties involved meet halfway
   f. I don't know
10. Who helped you most to solve a conflict ?
    a. Members of the school management
    b. Colleagues
    c. The chief of department
    d. The school's psychologist
    e. Other .....
11. How is the relationship between the parties after a conflict has ended ?
    a. The same as before, the conflict is forgotten
    b. The relationship keeps going but there is unexpressed discontentment
    c. On the first occasion there will be another conflict
    d. The relationship turns cold
    e. Nu ştiu
12. Do you consider this academic year has been difficult?
    a. Yes
    b. Most of the times no
    c. Not necessarily
    d. No

    No of years of experience :

    Sex:

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THE INFLUENCE OF PERCEIVED COLOURS OVER THE REACTION ACCURACY OF YOUTH TENNIS PLAYERS

MOCA COSMIN MIHAI[1,*], GHERŢOIU DAN MIHAI[1]

ABSTRACT. Introduction. Reaction is a purposeful voluntary response to an external stimulus. There is certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time. **Objectives***.* The aim of this paper was to determine if different colour contrasts affects the reaction time of young tennis players. **Materials and Methods***.* The participants in this study were young tennis players (N = 10), 3 females and 7 males, with the ages between 12 to 13 years old. **Results.** There was a significant difference in the scores for white background (M=7.5, SD=1.51) and orange background (M=6, SD=0.81) conditions; t(9)=3.30, p = 0.009. **Conclusion.** Our study managed to show that a different kind of background colour can affect the reaction accuracy in identifying an object of different shape and colour than the background.

Keywords: *tennis, reaction accuracy, colours, visual, tapping*

REZUMAT. ***Influenţa culorilor percepute asupra acurateţii reacţiei la jucătorii tineri de tenis*****. Introducere.** Reacţia este un răspuns voluntar la un stimul exterior. Există un anumit timp între aplicarea stimulului şi un răspuns motor la acest stimul numit timp de reacţie. **Obiective**. Scopul acestei lucrări este de a vedea dacă contraste diferite de culori afectează timpul de reacţie la jucătorii tineri de tenis. **Material şi metode**. În acest studio au fost cuprinşi jucători tineri de tenis (N=10), 3 fete şi 7 băieţi cu vârste cuprinse între 12 şi 13 ani. **Rezultate**. Au fost diferenţe semnificative pentru culoarea alba (M=7.5, SD=1.51) şi culoarea portocalie (M=6, SD=0.81); t(9)=3.30, p=0.009. **Concluzii.** Studiul nostru a reuşit să arate că un fundal de culori diferite poate afecta acurateţea reacţiei în identificarea unui obiect de altă culoare decât fundalul.

Cuvinte cheie*: tenis, acurateţea reacţiei, culori, vizual, tapping*

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Introduction

Reaction is a purposeful voluntary response to an external stimulus. There is certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time. Reaction time is defined as interval of time between presentation of stimulus and appearance of appropriate voluntary response in a subject (Batra et. al., 2014; Grrishma et. al. 2013). It is usually expressed in milliseconds. It reflects the speed of the flow of neurophysiological, cognitive, and information processes which are created by the action of stimulus on the person's sensory system. The receipt of information (visual or auditory), its processing, decision making, and giving the response or execution of the motor act are the processes which follow one another and make what we call the reaction time (Madan et. al., 1984; Malathi et. al., 1990; Baayen and Milin, 2010).

Many factors have been shown to affect reaction time including gender, age, physical fitness, level of fatigue, distraction, alcohol, personality type, limb used for test, biological rhythm, and health and whether the stimulus is auditory or visual (Baayen and Milin, 2010). Reaction time is independent of social-cultural influences. Prolonged reaction time denotes decreased performance (Shah et. al., 2010).

The choice reaction time can be studied by using visual inputs or by using auditory inputs. When studied using visual inputs it is called visual choice reaction time. Contemporary models of color vision assume that chromatic information is extracted through two independent postreceptoral cone-opponency channels, processing red-green (L-M) and blue-yellow (S-[L-M]) information (where S, M, and L represent input from short, middle, and long wavelength sensitive cones, resp.) (Lit et. al., 1971). Because of this, red, green, and yellow colors were used for the study. Reaction time is faster when the dominant hand is used when compared with the opposite side. Visual choice reaction time using the dominant limbs was studied. Reaction time is faster in men compared with women (Misra et. al., 1985).

Objectives

The aim of this paper was to determine if different color contrasts affects the reaction time of young tennis players.

Methods

Subjects

The participants in this study were young tennis players (N = 10), 3 females and 7 males, with the ages between 12 to 13 years old.

Methods and the Steps of the Research

For the purpose of this study four background colours were used: white, green, orange and gray. Over these colours, a yellow circle would appear a total number of 10 for each background. The time gap between the appearence of the yellow circle was randomize by the computer. The number of successful clicks for each appearence of the circle was quantified for each subject.

The background colours were chosen as follows: white – reference, green – the colour of a grass tennis field, orange – the colour of a slag tennis field, and gray – the colour of a concrete tennis field.

Results

After the tests were finished we've collected the following data for each subject and for each background tested.

Table 1. Successful clicks of each subject for each background tested

Subject	White_Board	Green_Board	Orange_Board	Gray_Board
1	7	8	5	6
2	6	7	6	7
3	8	8	5	6
4	9	8	7	6
5	9	9	6	8
6	9	8	6	6
7	6	9	5	8
8	7	9	7	7
9	5	7	6	7
10	9	9	7	7

A paired-samples t-test was conducted to compare successful clicks on white and green background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and green background (M=8.2, SD=0.79) conditions; t(9)=-1.65, p = 0.132. This means that the white and green colour have no influence over the reaction accuracy of the subjects regarding the yellow circle.

A paired-samples t-test was conducted to compare successful clicks on white and orange background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and orange background (M=6, SD=0.81) conditions; t(9)=3.30, p = 0.009. This means that the change from white to orange colour has a major influence over the reaction accuracy of the subjects regarding the yellow circle. The successful clicks decrease when the orange background is used.

A paired-samples t-test was conducted to compare successful clicks on white and grey background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and grey background (M=6.8, SD=0.78) conditions; t(9)=1.17, p = 0.271. This means that the white and gray colour have no influence over the reaction accuracy of the subjects regarding the yellow circle.

Table 2. Mean, Standard deviation and standard error mean calculated for each pair of backgrounds

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	White_Board	7.5000	10	1.50923	.47726
	Green_Board	8.2000	10	.78881	.24944
Pair 2	White_Board	7.5000	10	1.50923	.47726
	Orange_Board	6.0000	10	.81650	.25820
Pair 3	White_Board	7.5000	10	1.50923	.47726
	Gray_Board	6.8000	10	.78881	.24944

Table 3. Paired sample t-test for each pair of backgrounds

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	White_Board - Green_Board	-.70000	1.33749	.42295	-1.655	9	.132
Pair 2	White_Board - Orange_Board	1.50000	1.43372	.45338	3.308	9	.009
Pair 3	White_Board - Gray_Board	.70000	1.88856	.59722	1.172	9	.271

Conclusion

Our study managed to show that a different kind of background colour can affect the reaction accuracy in identifying an object of different shape and colour than the background.

These results may point towards the idea that tennis players must train their reaction accuracy according to the type coloured field they will play on. The fact that the orange background drastically reduces the accuracy of the young tennis players shows that slag fields may lower their performance during play.

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BODY SHAPING THROUGH AEROBIC TRAINING IN THE GYM IN ADULT WOMEN

GIURGIU ALEXANDRA[1,*], HANȚIU IACOB[1]

ABSTRACT. Introduction. Regular physical activity has positive effects on human body composition, even if not combined with a diet. For many people this activity aims to reduce the amount of fat in some areas of the body and targets body shaping. **Objectives.** The main objective of this study was to learn about the effects of a 12-months regular participation in aerobic training exercises. **Methods.** This study was voluntarily attended by 89 women with an average age of 31.62, practicing aerobic exercises in gyms, three times a week for a period of 12 months. We carried out anthropometric measurements of subjects at the beginning and at end of the study, respectively, and data was statistically analysed using the SPSS 23.0 software. **Results.** Data collected was statistically processed, showing that participation in physical training led to reducing body weight by 4.81 kg, decrease of adipose tissue - between the two moments there was a difference of 5 % - fat mass decreased by 4.26 kg, and lean body mass by 0.55 kg. Significant decrease in chest, waist and hip circumference was also noticed. **Conclusions.** Regular participation in physical training programs involving aerobic exercise for 12 months has had the effect of reducing body weight and the amount of fat in some areas of the body, materialized by decreasing the value of the circumference of the chest, waist and hips, with the intention of reaching the ideal body weight and aiming for body shaping.

Keywords*: body shaping, physical activity, adipose tissue/ fat, adult women, ideal body weight.*

REZUMAT. ***Modelare corporală prin activități fizice în sala de fitness la femei adulte. Introducere:*** Practicarea regulată a activităților fizice are efecte pozitive asupra compoziției corporale, chiar dacă nu sunt combinate cu o dietă alimentară. Pentru multe persoane această activitate are în vedere reducerea cantității de țesut adipos din unele zone ale corpului, modelarea corpului. **Obiective:** Obiectivul principal al acestui studiu a fost să aflăm care sunt efectele participării cu regularitate, timp de 12 luni, la programe de antrenament aerobic.

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Metode: La acest studiu au participat voluntar 89 de persoane de gen feminin cu vârsta medie de 31,62, practicante ale activităților aerobice în cadrul unor săli de fitness, de trei ori pe săptămână, timp de 12 luni. Au fost efectuate măsurători antropometrice la începutul și sfârșitul studiului, iar datele au fost analizate statistic cu ajutorul programului SPSS 23.0. **Rezultate:** Datele colectate au fost prelucrate statistic, reieșind că participarea la antrenament a avut ca efect reducerea greutății corporale cu 4.81 kg, țesutul adipos a scăzut – între cele două momente de timp existând o diferență de 5 procente – masa grasă a scăzut cu 4,26 kg, iar masa slabă cu 0,55 kg. De asemenea, s-au constatat reduceri semnificative ale circumferințelor pieptului, taliei și șoldurilor. **Concluzii:** Participarea cu regularitate la programe de antrenament cu exerciții aerobice timp de 12 luni a avut ca efect reducerea greutății corporale și a cantității de țesut adipos din unele zone ale corpului, concretizată prin scăderea valorii circumferințelor pieptului, taliei și șoldurilor, cu intenția de a se apropia de greutatea corporală ideală și de modelare a corpului.

***Cuvinte cheie**: modelare corporală, activitate fizică, țesut adipos, femei adulte, greutate corporală ideală.*

Introduction

Body shaping refers to the transformation of one or more areas of the human body through certain procedures, including physical exercise. Specifically, it is about reducing body weight. Body shaping training programs can be followed by people of all ages, both women and men. When we refer to weight loss, we consider both the reduction of fat percentage and the maintenance or development of muscle mass (Mendonca, 2014). According to the American Council of Exercise (2018), a non-athlete woman should have less than 31% body fat and a non-athlete man less than 24%. This difference is due to the fact that in general men have more developed muscles.

The standards of the female body have changed substantially during the development of human society. These changes have been at a much faster pace in the XXth century and the beginning of the XXIst, the influence of the written and audio-visual media being sometimes decisive, intensely publicizing some sizes of the perfect body, such as "90-60-90" (chest circumference - waist circumference - hip circumference in cm).

Body image is directly related to body shaping and can be either positive or negative. The relationship between body image and physical exercise is strong, and issues such as body weight and one's satisfaction with his/her body

influence participation in physical activities. Brudzynsky (2010) argues that the perception of one's own body can be an advantage or a disadvantage in the practice of physical exercises. Overweight and obese people engage more themselves in physical activity in order to lose more weight than people who are not perceived as having an excessive body weight. A barrier in the practice of physical exercises is the negative perception of own body image, more precisely in the case of people who manifest a strong social anxiety.

The sciences that deal with the technique of measuring the human body and establishing the relationships between the parameters obtained through these measurements is the anthropometry or the somatometry. In order for a body to look harmoniously developed, there must be certain relationships, a certain proportionality, between its different parts. When we talk about the ideal female body, we also refer to body proportion, which is related to the general appearance of the human body. The ideal weight can be calculated using several formulas, in all of which the height of the subjects being used. According to the National Heart, Lung, and Blood Institute, "the ideal weight is defined as a body mass index between 18.7 - 24.9 for all adults, regardless of age" (Heiat, 2003).

Physical exercise has gained notoriety as a type of activity that involves minimal investment, having many benefits and which can be practiced by a large part of the population. It is one of the reasons why more and more people are going to gyms. The *American College of Sports Medicine* recommends regular physical activity because they have a positive contribution to health management and well-being (Pate et al., 1995).

Among the physical activities carried out in a gym we often encounter aerobic training, which are recommended for decreasing the percentage of body fat, improving physical fitness, building muscle strength, decreasing the circumference of the waist, hip and thighs. In recent years, *The American College of Sports Medicine (ACSM)* (2013) annually publishes training opportunities for a healthy lifestyle.

Our study aimed to analyse the effects of aerobics training programs conducted in gyms for 12 months on anthropometric parameters in some parts of the adult female body.

Working hypothesis

In this study we started from the working hypothesis that the participation of adult women in aerobic training programs in gyms will have the effect of reducing both body weight, and the chest, waist and hip circumference, as well as changing body composition.

Materials and methods

This study was carried out between January 2016 and January 2017 in two fitness rooms in the city of Oradea, with the voluntary participation of 89 adult women. The study subjects gave their written consent, being ensured of maintaining the confidentiality of their data. Three aerobic exercise workouts (Circuit, Softball, Fit ball, Aerobics and Tae-bo) were planned each week, each session lasting 60 minutes. At the beginning and at the end of the research, participants were subjected to waist, body weight, skinfold, and body circumference (chest, waist and hip) measurements.

The data thus collected were statistically analysed using the SPSS software, ver. 23.0.

The following formulas were used to calculate the ideal body weight:

- Ideal body weight = height (cm) - 105 (in women);
- Hammond's formula: Wt (kg) = 45 + 0.9 x (Ht-150 cm);
- Ideal body weight formula based on gender and age: IBW = (50 + 0.75x (W-150) + (A-20) / 4) x0.90.

To calculate the percentage of adipose tissue, the measurement of five skin folds was used, and the calculation formula used was: Adipose tissue (%) = sum of the five skin folds (mm) x 0.15) +5.8 + SC m^2.

Results

The research female subjects had an average age of 31.62 (6.59) years, with a minimum age of 18 and the maximum age of 52. Of the total 89 subjects, 5 (5.62%) were under 25 years old, 65 (73.03%) were between 25 and 34 years old, 13 (14.61%) were between 35 and 44 years old, and 6 (4.74%) were over 44 years old (see Figure 1 and Table 1 below).

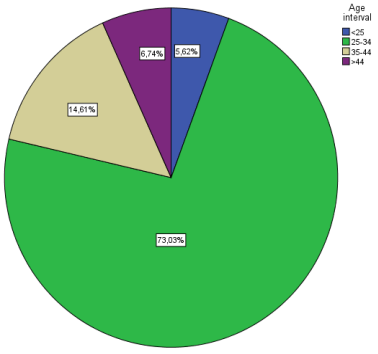

Figure 1. Percentage distribution of subjects by age range (N = 89)

Table 1. Descriptive analysis of the age of subjects included in the study (N = 89)

Descriptive Statistics

Age range	N	Minimum	Maximum	Mean	Std. Deviation
< 25 years	5	18	24	21.38	2.503
25-34 years	65	25	34	29.52	2.776
35-44 years	13	35	44	37.94	2.695
> 44 years	6	47	52	49.30	1.849
Total	**89**	**18**	**52**	**31.62**	**6.597**

The mean body weight of the subjects at the initial testing was 65.62 (13.77) kg, the highest value being 114 kg while the lowest was 48 kg (see Table 2 below), these parameters indicating the lack of homogeneity of the survey sample. In terms of ideal body weight, the table shows us that there are small differences between the different calculation formulas we used. Thus, when calculated according to gender and age this difference was 59.99 (3.53) kg, while according to the Broca index the difference was 63.33 (4.50) kg, and if calculated according to the Hammond formula the difference was 61.49 (4.05) kg.

Table 2. Descriptive analysis of anthropometric data and parameters (N = 89)

Descriptive Statistics

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Body Weight (kg)	89	65.62	13.77	48	114
Height (cm)	89	168.33	4.50	161	180
Ideal Body Weight (kg)	89	59.99	3.53	54.39	68.25
Broca index	89	63.33	4.50	56	75
Ideal Body Weight Hammond	89	61.49	4.05	54.9	72.0
Valid N (list wise)	89				

In order to notice the effect of the physical activity intervention programs on the percentage of adipose tissue, fat mass and lean body mass, we used the method focused on analysing the skin folds' measurement results. The test of the normality of the data distribution was carried out with the help of the Kolmogorov-Smirnov Goodness of Fit Test, resulting that they were normally distributed only in terms of percentage of fat tissue (BF), followed by a paired sample-test, while for the fat mass and lean body mass the Wilcoxon test was used.

From the analysis we notice that between the two evaluation moments (T1 and T2) there are significant differences, the participants' body weight decreased by 4.81 kg, adipose tissue decreased by 5%, fat mass decreased by 4.26 kg, and the difference in terms of lean body mass was 0.55 kg (see Table 3).

Table 3. Descriptive analysis of body mass composition determined by measuring 5 skin folds before and after the physical activity intervention program (N = 89)

Descriptive Statistics									
Variable	N	Mean	Std. Deviation	Min.	Max.	t*/Z	df	Sig. (2-tailed)	r/d**
BW (kg) T1	89	65.621	13.7691	47.6	114.0	7.81	88	.000	0.82
BW (kg) T2	89	60.811	8.6902	50.0	85.3				
BF (%) T1	89	22.8806	2.42151	15.91	27.92	30.96*	88	.000	3.282**
BF (%) T2	89	17.8847	1.88646	13.25	22.67				
BFM (kg) T1	89	15.1398	4.17682	8.12	29.36	-8.19	88	.000	-0.613
BFM (kg) T2	89	10.8770	1.95907	7.15	17.22				
LBM (kg) T1	89	50.4816	9.97462	37.01	84.65	-.824	88	.410	No
LBM (kg) T2	89	49.9342	7.20757	39.96	70.28				
Valid N (list wise)	89								

Note: BF= Body Fat; BFM=Body Fat Mass; LBM=Lean Body Fat; *t-test; ** Cohen'd

Significant decrease was also found in terms of circumferences (see Table 4 below). Thus, the average circumference of the chest decreased from 94.438 cm to 90.079 cm (4.36 cm difference), that of the waist from 73.785 cm to 70.627 cm (3.16 cm difference), and that of the hip from 102.298 cm to 96.528 cm (5.77 cm difference). The differences between the circumference means, calculated in the two moments of the measurements, are significant and the effect is substantial (> 0.80).

Table 4. Descriptive analysis of circumferences by measurement time (N = 89)

Descriptive Statistics									
Variable	N	Mean	Std. Deviation	Min.	Max.	t	df	Sig. (2-tailed)	Size effect (d)
CC (cm) T1	89	94.438	7.0501	80.0	119.0	13.775	88	.000	1.46
CC (cm) T2	89	90.079	5.1417	79.0	109.0				
WC (cm) T1	89	73.785	10.0843	57.0	101.0	12.206	88	.000	1.29
WC (cm) T2	89	70.629	8.6621	57.0	90.0				
HC (cm) T1	89	102.298	7.8192	87.0	135.0	15.080	88	.000	1.60
HC (cm) T2	89	96,528	5,5944	85,0	117,0				
Valid N (list wise)	89								

Note: CC= Chest circumference; WC= Waist circumference; HC= Hip circumference

Table 5. Correlations between body mass, chest, waist and hip circumference after completion of the physical activity intervention program (N-89)

Correlations

		BW (kg) T2	CC (cm) T2	WC (cm) T2f	HC (cm) T2
BW (kg) T2	Pearson Correlation	1	.516**	.436**	.475**
	Sig. (2-tailed)		.000	.000	.000
CC (cm) T2	Pearson Correlation	.516**	1	.308**	.248*
	Sig. (2-tailed)	.000		.003	.019
WC (cm) T2f	Pearson Correlation	.436**	.308**	1	.149
	Sig. (2-tailed)	.000	.003		.164
HC (cm) T2	Pearson Correlation	.475**	.248*	.149	1
	Sig. (2-tailed)	.000	.019	.164	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

In order to notice if there was a correlation between the subjects' body weight and her chest, waist and hip circumference, the Pearson correlation coefficient (see Table 5 above) was calculated at the final test (T2). The analysis of the measurements performed at the end of the physical activity intervention program reveals that there is an acceptable correlation between body weight and measured circumferences (see Table 5). Moreover, the correlation analysis shows a lack of correlation between the circumference of the chest and that of the hip, while there is an acceptable correlation for other circumferences.

The graphical representation of the correlation between body weight and waist circumference (see Figure 2) indicates a coefficient of determination of R^2 = 0.324, which means that in 32% of subjects the linear relationship between circumference and body mass can be substantiated, and the Pearson correlation coefficient (r = 0.57) shows a moderate to good correlation between waist circumference and body weight. At time T2, the mean body weight of the survey sample was reduced by 4.82 kg, and waist circumference by 3.16 cm., while the coefficient of determination R^2 was reduced to 0.190, so only in 19% of subjects the increased waist circumference can be explained due to their high body weight, Pearson correlation coefficient r = 0.44 indicating an acceptable correlation between the subjects' waist circumference and body weight.

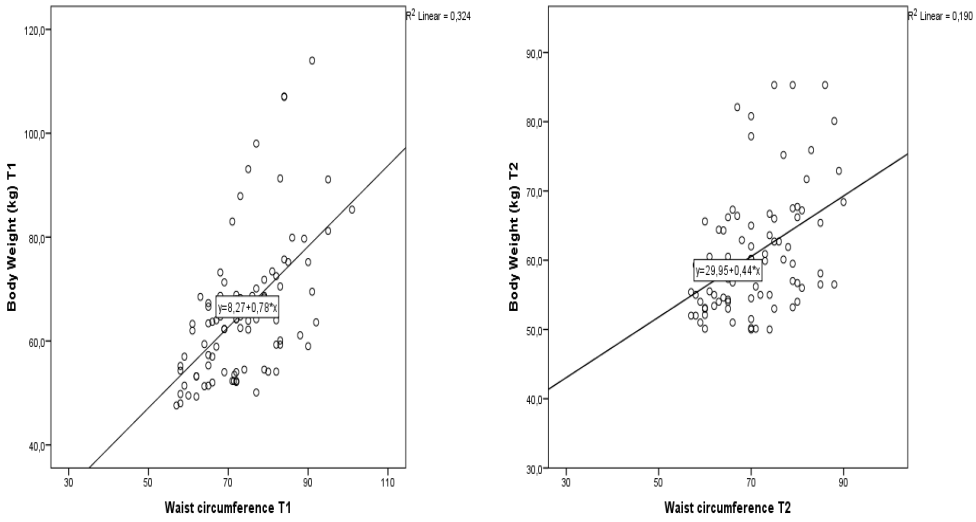

Figure 2. Correlation between body weight and waist circumference before and after the physical activity intervention program (N = 89)

Discussion

It is advisable that body weight analysis be carried out in comparison with the ideal body weight. Weber, Velazquez & Weber (2018) recommend calculating the ideal body weight using the Broca index, other authors suggesting Hammond's formula or the one that uses gender and age in determining the ideal body weight. Following the statistical analysis of the measurements, performed before and after the physical activity intervention program, we notice that the latter had the effect of reducing body weight, percentage of adipose tissue, fat mass and resulted in a slight increase in lean body mass.

The measurements made in the two moments of time showed a weight difference of 4.81 kg and we can state that the physical activity intervention program had a positive effect, triggering a reduction in participant's body weight. The average body weight after the application of the intervention program was 60.81 kg, close to the value of the ideal body weight calculated according to gender and age (59.98 kg, according to Table 2 above). In a study carried out on 232 adult women aged 40 to 50 years Choi, Guiterrez, Gilliss and Lee (2012) found that the subjects who did not engage in physical activity increased weight, those who had a low level of physical activity had only a slight weight gain and a slight decrease in waist circumference. Similar results were obtained by Pelin and Osman (2019) in a study in which the survey sample was made by 45 sedentary women who participated in an aerobic exercise program three times a week, for 12 weeks. They managed to reduce their body weight from 70.83 (1.67) to 64.41 (1.72).

The influences of physical exercise programs were also evident on the circumferences of the chest, waist and hips, and significant reductions were found in these dimensions, the impact being rather strong (> 0.80).

Our results showed that the physical activity intervention program also triggered some effects on body composition of the women participating in the program. The percentage of adipose tissue and the amount of fat mass decreased, causing a slight influence on the amount of lean body mass. In a similar study by de Mendonça, de Araújo Júnior, de Sousa & Fernandes (2014), an exploratory and descriptive survey conducted on 89 women aged between 25 and 55 years (41.42 ± 9.23 years), carried out for 18 weeks, the subjects practiced various physical exercise programs. Regardless of the type of exercise program they practiced, the authors noted healthy effects in the physical activity groups compared to the control group.

Conclusions

Following the implementation of the physical activity intervention program it resulted that in the subjects from the sample included in the research, in terms of body weight and percentage of adipose tissue variables, the differences between the means were significantly smaller at the final measurements than at the initial measurements, this means that the applied programs had achieved the goal.

Our results were similar to those obtained in other studies. Many studies have reported that a large waist circumference and an increased body mass index (> 25) indicate a state of overweight or obesity, being associated with a low level of physical activity or with physical inactivity.

By participating in aerobic exercise training programs, study participants were able to reduce their body weight and decrease the amount of adipose tissue in some areas of the body, with the intention of approaching the ideal body weight and obtain body shaping.

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CONSIDERATIONS REGARDING THE DEVELOPMENT OF THE eSPORTS PHENOMENON

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ABSTRACT. eSports (Electronics Sports or short for esports, e-sports) is the term used in multiplayer computer games competitions, most of them organized and dedicated to professional players. Nowadays, esports has become a real industry, generating profits for the hardware companies, for the event organizers, but especially for the players, who can reach record receipts from the awards given at different events around them. Esports has slowly evolved into a cultural phenomenon. Across Asia, North America and Europe, the best pro gamers are competing for a share in hundreds of thousands of dollars at each tournament, watched by thousands if not millions of people around the globe. The present paper aims to present some theoretical aspects regarding the connection between sport and society, and also the development of electronic sport in Romania.

Keywords: *eSport; Professional video gaming; Competitive video gaming.*

REZUMAT. ***Consideraţii cu privire la dezvoltarea fenomenului eSport.*** eSports (Electronics Sports sau prescurtare pentru eSports, e-sport) este termenul folosit în competiţiile de jocuri pe computer multiplayer, majoritatea organizate şi dedicate jucătorilor profesionişti. În zilele noastre, eSports a devenit o adevărată industrie, generând profituri pentru companiile de hardware, pentru organizatorii de evenimente, dar mai ales pentru jucători, care pot ajunge la încasări record din premiile acordate la diferite evenimente din jurul. eSportul a evoluat încet într-un fenomen cultural. În toată Asia, America de Nord şi Europa, cei mai buni jucători profesionişti concurează pentru o cotă de sute de mii de dolari la fiecare turneu, urmăriţi de mii, dacă nu chiar de milioane de oameni din întreaga lume.

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Prezenta lucrare își propune să prezinte câteva aspecte teoretice referitoare la conexiunea dintre sport și societate, precum și dezvoltarea sportului electronic din România.

Cuvinte cheie: *eSport; Jocuri video profesionale; Jocuri video competitive.*

Introduction

People have been competing since the beginning of civilization for gold and glory, the Spartans were competing on the hills of Greece and the Romans were facing the lions in the arena (Barbu, 2004). Today these competitions are called sports and we try to be civilized, so civilized that they happen in front of a computer (Hallmann and Giel, 2018).

What are esports really about? There are computer games so competitive that they have acquired the status of sports, and young people from all over the world are fighting for the title of best. Whether you believe it or not, millions of fans watch esports daily and support their favorite teams at stadiums more than traditional sports microbes do.

Esports refers to the practice of video games as part of a competition. These are games that thwart one or more players against each other. Esports have been in place since the 1970s. But the practice began to be more frequent in the 1990s at the LAN Party, but still on a small scale.

Today, it gathers millions of fans around the world. This madness encourages more and more investors (Razer, Roccat, Asus, Acer, Benq, Steelserie, Winamax or Orange) to take an interest in this environment. These investments are materialized by the event sponsor (esports tournament) and players, so that esports are considered a trend in a continuous growth.

Literature review

1. Factors leading to the development of esports

At no other time in history has sport played a dominant role in everyday life (Barbu and Popescu, 2018). Due to the prevalence of internet and television, adults and children consume sports at an amazing level.

When we are not physically involved in sports, we play them through video games or fantasy leagues and watch them on TV. The celebrity status of the top athletes speaks about the importance we attach to sporting events.

The first known video game competition was held in 1972 at Stanford University, where Spacewar was played. But esports became even more popular around 1980 through the Space Invaders Championship organized by Atari. The event attracted over 10,000 participants from the USA and also gave birth to bets on this type of sporting event.

The esports phenomenon was first popularized in South Korea. Here you can meet video games competitions since 1998. With the passage of time, the phenomenon has increased and tournaments, leagues, teams and superstars have been formed. With the help of fans, entire communities of gamers have been formed. The two games that made sense in South Korea are Starcraft II (RTS) and League of Legends (Brock, 2017).

Geographically, esports has its roots in Germany, but the best organized in the esports system are the South Koreans, who have been offering professional player licenses since 2000. In the 1990s, many games benefited from the increased quality of internet connectivity. The rise of esports in South Korea is believed to have been influenced by the mass emergence of broadband Internet networks that preceded the 1997 Asian financial crisis.

Nowadays, esports has become a real industry, generating profits for the hardware companies, for the event organizers, but especially for the players, who can reach record receipts from the awards given at different events around the globe. The sums are so large that the players (the most talented of them), will probably reach the near future, to win amounts similar to those won by footballers, tennis players, basketball players, etc.

Esports tournaments are organized almost always in public places (with spectators). The tournament may be part of a larger gathering, as is the case with Dreamhack, or it may be the whole event, as is the case at World Cyber Games.

Not all computer games are also electronic sports. Electronic sports are divided into several categories such as FPS (First Person Shooter), MOBA (Multipayer Online Battle Arena) and RTS (Real Time Strategy). Probably more familiar would be titles like Counter Strike, DOTA, Starcraft or League of Legends, competitive sports whose championships offer prizes worth millions of dollars, only last year's The International DOTA2 championship giving prizes up to 18 million of dollars.

These sports are played in teams of five people, usually young people up to 25 years old who have turned computer games into a profession. Being a cyber-athlete or gamer means moving to a gaming house to spend 8-10 hours in front of your computer training with the team to participate and win championships and sponsors. In other words, an activity similar to that of regular athletes (Tiedemann, 2004).

There are about 200 million viewers watching electronic sports. For example, the 2014 League of Legends finale was watched by 32 million people from around the world, 6 million more than the NBA Finals in the same year.

The most beloved fans of traditional sports will probably challenge the authenticity of electronic sports in the absence of their physical character. "Sports are not sports if you don't sweat", yet even traditional sports leaders gradually recognize electronic sports. Yes, these games require state-of-the-art equipment, perfectly built for the needs of professional gamers. Nothing is left to chance, because apart from the results of these sports competitions, the emphasis is on a transmission of impeccable quality. It is common practice in this segment for professional players to make available live sessions to educate and train a new generation of e-athletes.

Professional players are often part of organized teams, such as Evil Geniuses, Fnatic, Titan and Natus Vincere and, besides the prizes from competitions, they can receive salaries from the teams they belong to. Sponsorship of a team can cover the costs of transport or gaming hardware (gear). One of the best known esports sponsor is the company RAZER, a manufacturer recognized especially for its accessories dedicated to the gaming segment.

Most of the events are broadcast live on the Internet, a phenomenon that is increasing in size in recent years. Companies like Amazon or Google have even launched their own streaming services - Twitch.tv and YouTube Gaming.

As video games become ever more popular, so too do esports. The more people play games, the more potential fans of esports there are. And as games grow more advanced, they become more exciting for spectators (Wagner, 2006).

Esports has yet to achieve popularity in mainstream culture, but the phenomenon is fast approaching a tipping point where it will. esports tournaments continue to grow in size and viewership, and each year brings them closer to the level of popularity and acceptance enjoyed by physical sports. Take, for example, the activity known as BarCraft, where “StarCraft II” fans gather in bars to watch pro matches over a cold beer and some snacks. Esports evolution can be also based on the developments of shared activities in which people cooperate to participate in joint activities (Barbu et al., 2020). The further progress of esports will be conditioned by the achievement of sound management principles (Constantinescu et al., 2008).

2. Electronic sport in Romania

Electronic sports competitions offer millions of dollars prizes, and organizations (clubs) have turnover comparable to those of traditional sports clubs. Also, the community continues to grow.

In Romania, the emergence of eSport is in close interaction with the emergence of Professional Gamers League, an organization founded in 2002 by Silviu Stroe with the aim of promoting electronic sports in Romania.

Thus, the first professional Counter-Strike championship in Romania was created in a format similar to the one in football, where the teams were divided into divisions from A to D. LPG was the first organization that managed to offer prizes in Romania. Thousands of euros and that has attracted support from sponsors.

Fortunately, Romania is one of the countries that counts in the world of esports. The tournaments organized by LPG have placed Romania in a leading place in Europe and even in the world (Fromme, 2003).

Gradually, the number of teams registered in the LPG increased with each season, all due to the fact that the matches could be played online, both at home and online. Only the finals were organized in the city of Constanța.

They also managed to participate in events outside Romania such as Dreamhack Winter 2011, Samsung European Championship 2010, Electronic Sports World Cup 2010, being among the few Romanian teams that did so during that period.

PGL brought to Romania the Playzeek platform, where players could play 5vs5 competitive matches without having to belong to clans, thus giving the community a chance to grow further as you could play competitive matches anytime without having to plan a few days before a single match. It was the ideal platform for the Romanian players to grow as a level and to reach the European teams that dominated the stage at that time.

But things changed in Romania with the advent of Counter-Strike: Global Offensive, which was dropped by Valve in the summer of 2012 as more and more organizations refused to add Counter-Strike 1.6 to the tournament playlist, because of the outdated graphics compared to the other games. Thus in 2013 PGL dropped the Playzeek platform.

Also, with the third edition of the Romanian Esports Championship he made the switch to Counter-Strike: Global Offensive and started organizing tournaments for games like DotA 2, League of Legends, and later for Hearthstone. Unfortunately, in the years that followed LPG began to occupy less and less of the Romanian esports scene, eventually giving up organizing internal competitions only for the players in Romania and went on to organize major tournaments from the gaming world. Thus, to date he has organized tournaments such as Counter-Strike: Global Offensive Major in Krakow in 2017 which was probably one of the best organized tournaments in Counter-Strike history.

This is why at the moment the events dedicated to electronic games are attracting more spectators even than the football matches in Liga 1. The prizes are also very generous.

In 2019, in Romania, several major events took place under the PGL umbrella. Between January 25-27, in Bucharest, FIFA Champions Cup and between January 9-13, 2019 the DOTA 2 Bucharest Minor. In the autumn of 2019, between October 18-20 Hearthstone Masters Tour Bucharest, and in November other two competitions were organized FIFA 20 Major Stage I and FIFA 20 Major Stage II.

Not only professional players are attracted to these events, but also gambling fans. At each competition the halls are full, sometimes with thousands of spectators, which led to an unusual situation at least in Romania: more fans gathered at the esports competitions than at the matches in the first football stadium.

In other countries things are not too different. The important duels are televised and even dedicated electronic games have appeared. For example, the 2017 Starcraft Global League Finals drew 25,000 on-stage and 300,000 online viewers, and Major League Gaming had over 11 million unique visitors in 2017.

Romanian teams such as 7Sins, KnockOut, RedFear, SinnerS Gaming or Nexus participate in online tournaments that have become increasingly popular in recent years and have considerable prizes, but cannot cope with teams that can invest at least 8 hours a day to train. This is probably the biggest problem that draws the Romanian teams down, namely that the players are not paid enough to allow them to invest so much time in the game.

3. Esports: a trend in a continuous growth

Even though eports was not so popular in the beginning, in recent years it has turned into a billion dollar industry. It doesn't matter that it's video games, esports is treated as a professional sport, where players are paid, there are millions of fans, sponsors and tournaments around the globe. The esports audience increased from 395 million viewers in 2018 to 454 million the following year, expecting that by 2022 the audience will exceed 645 million viewers (figure 1).

As the number of spectators increased, the revenues of this industry also increased. Becoming a popular industry, they were noted by different investors and different brands, reaching the amount of $ 400 million, earnings only from sponsorships, in 2019. According to Newzoo, which analyzes the gaming industry, in 2018 earnings from esports amounted to over $ 865 million, reaching $ 1.1 billion in 2019 and projected to increase to 1.8 billion $ in 2022 (figure 2).

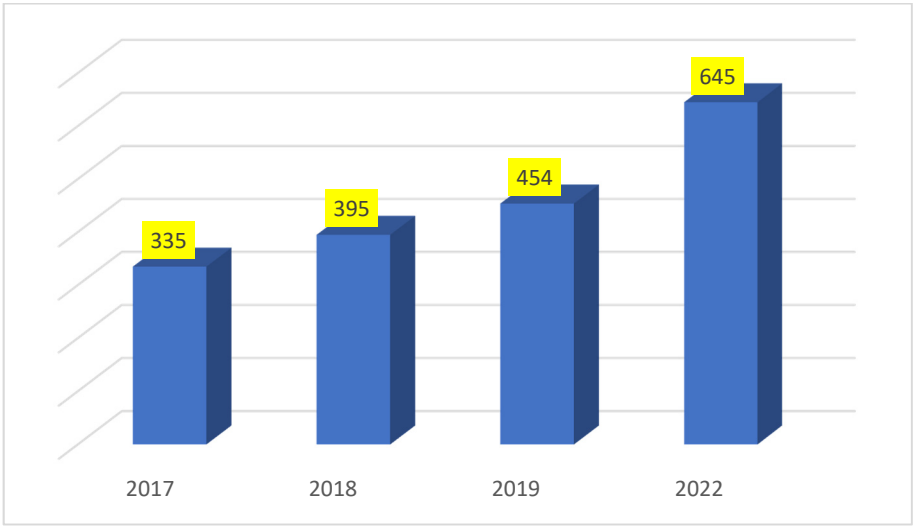

Figure 1. Projected growth in esports audience (million viewers)

Source: Adapted from https://newzoo.com/insights/articles/newzoo-global-esports-economy-will-top-1-billion-for-the-first-time-in-2019/

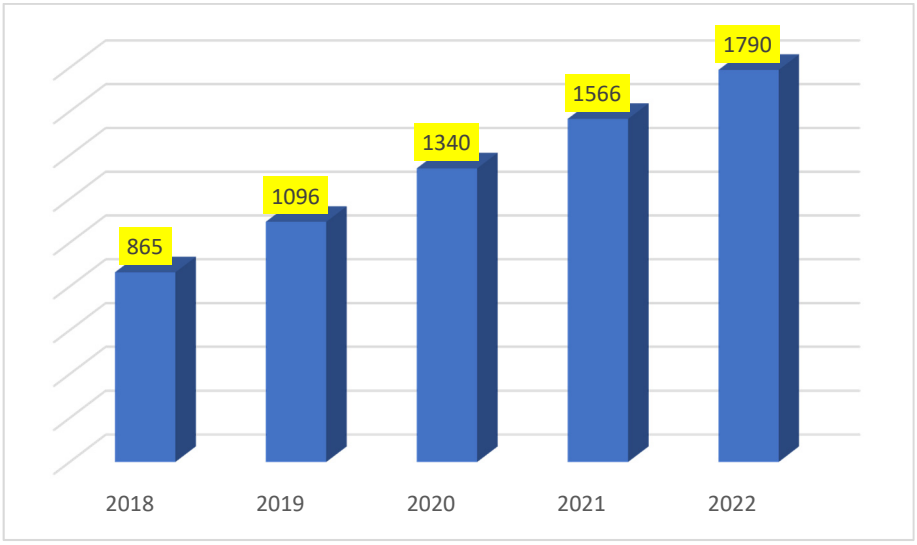

Figure 2. Increase in esports revenues (millions USD)

Source: Adapted from https://newzoo.com/insights/articles/newzoo-global-esports-economy-will-top-1-billion-for-the-first-time-in-2019/

With the growth and popularity of this industry, the number of professional players has increased more than ever, their earnings from 2019 exceeding $ 195,000,000 million. The games which made the biggest wins in 2019 were:

- *Fortnite*, with winnings of $ 54,815,883 million, 2093 professional players and 249 tournaments;
- *Endowment 2*, with winnings of $ 43,373,966 million, 1003 professional players and 132 tournaments;
- *CSGO*, with winnings of $ 11,800,867 million, 2905 professional players and 421 tournaments;
- *Call of Duty*: *Black Ops 4*, with winnings of $ 6,514,307 million, 342 professional players and 37 tournaments;
- *Overwatch*, with winnings of $ 5,551,298 million, 1010 professional players and 46 tournaments.

It's also worth noting, for those less familiar with esports, that the most popular games are not traditional sports-related video games such as Madden or FIFA (Goldstein, 2005). Rather, the popular esports series include multiplayer online battle arenas (where a player controlling a single character is part of a team that must destroy the opposing team's main building), real-time strategy (where a player builds an army to gain dominance over a map), or first-person shooter games (where players take part in a firefight across a map).

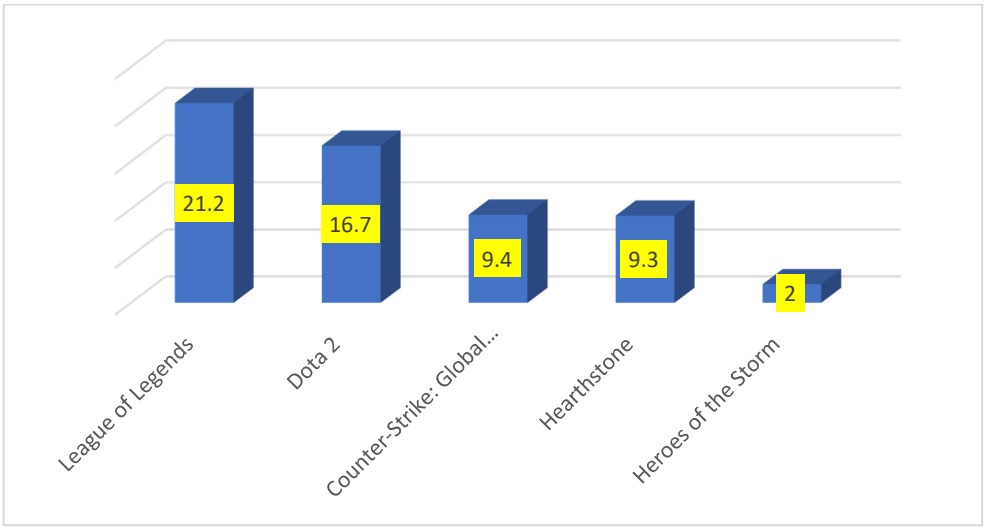

Figure 3. Top-five esports on Twich (millions hours)

Source: Adapted from https://newzoo.com/insights/rankings/top-games-twitch/

Most fans are in Asia, North America, and Europe: In the past, people thought that the craze of competitive video gaming was primarily an Asian phenomenon, yet today only 51% of esports enthusiasts are in Asia. In fact, North America and Europe have taken a prominent place in the global esports and gaming ecosystem (Hollist, 2015).

We appreciate that eports has the potential to become a global phenomenon. Stared as a niche competition, eports is getting wider acceptance and this is due to younger generations that are digitally oriented. As the possibility to transmit the games in a spectacle like manner increases, so the audience of the esports will continue to expand. We consider that another element that can lead to increased fans audience will be the possibility to play in teams and the creation of year-long competitions (like football championships) instead of isolated tournaments.

Conclusions

Electronic sport has grown enormously in recent years, and the speed at which it continues to expand is amazing. In just a few years, electronic sport has crossed the borders of video games, becoming a mass phenomenon that attracts millions of fans, but also substantial amounts of money. The esports industry is the most technologically driven sport the world has ever seen. There's a strong possibility it will overshadow traditional sports within the next 5-10 years.

More and more important names are associating their image with this new industry. Coca Cola and Red Bull are just two examples. Often, teams have their own smaller sponsors who support their activity. Teams and players have a big opportunity to become strong brands (Florea et al., 2018).

Investors in the gaming segment also understood the potential of this industry and began to enter this market. In Beijing, there is already an arena dedicated to esports competitions, and Ourgame, the owner of the World Poker Tour, has announced that it plans to invest in a similar arena in Las Vegas. So far, most competitions are held in rented spaces, so this is a new step for the esports industry (Seth et al., 2017).

According to analyses published on the American websites, the e-sports industry has surpassed it in terms of revenues on the music one. Annually, esports competitions and events around the world produce net revenues estimated at $ 20 billion in excess of the music industry. A figure that can no longer be ignored by investors. Nowadays, esports has become a real industry, generating profits for the hardware companies, for the event organizers, but especially for the players, who can reach record receipts from the awards given at different events around the globe. Esports has slowly evolved into a cultural

phenomenon. Across Asia, North America and Europe, the best pro gamers are competing for a share in hundreds of thousands of dollars at each tournament, watched by thousands if not millions of people around the globe.

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OPTIMIZING THE PHYSICAL EDUCATION LESSONS FOR HARMONIOUS PHYSICAL DEVELOPMENT AT FOURTH GRADE STUDENTS THROUGH DYNAMIC GAMES

PRODEA COSMIN[1*], BLAGA NORA FRIDA[2]

ABSTRACT. Education begins in the moment we are born and continues our entire lives having a crucial part during our school period. This a very important period of time because it is when a child develops forms itself and learns to be conscious that everything contributes to their development as human beings. The approaching methods are very diversified, but between the ages of 7-10 (primary level) are the most appropriate and very handy to complete these tasks. Two of these tasks have the main objectives to develop the motor qualities and the harmonious physical development of children. Through these active games, the objective of Physical Education is completed simultaneously, in an attractive manner, thus helping and shortening the development of these motor skills. The study has been conducted at Baia Sprie Gimnasium School, from Baia Sprie, Maramures county, with a total of forty fourth graders, between the ages of 9-10. The general preparation and result registration of the experiment took place in the school year of 2018-2019. All the tests and measurements were made rigorously during Physical Education lessons. At the beginning of the school year, in September, all the initial tests were made for both class groups. The final tests were carried out in May 1-25. The following research methods were used: observation, experiment, the mathematical and statistical method, the statistical mathematical method.

Key words*: Physical Education, dynamic games, harmonious physical development, the development of motor qualities, Physical Education objectives.*

REZUMAT. ***Optimizarea orelor de educație fizică în vederea dezvoltării fizice armonioase a elevilor de clasa a IV-a, prin intermediul jocurilor dinamice.*** Educația începe odată cu nașterea ființei umane și se continuă pe tot parcursul vieții, având o etapa crucială în perioada școlară, când copilul se formează, învață să-și însușească tot ceea ce contribuie la formarea sa ca și om.

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Metodele de abordare în lecția de educație fizică sunt multiple și diferite, însă la vârsta școlară mică cuprinsă intre 7-10 ani (ciclul primar) jocurile de mișcare, jocul in sine este metoda cea mai potrivită și la îndemâna pentru realizarea sarcinilor, precum și pentru realizarea obiectivelor educației fizice, iar doua dintre cele mai importante obiective fiind dezvoltarea calităților motrice respectiv dezvoltarea fizica armonioasa. Prin jocurile de mișcare, aceste obiective ale educației fizice se realizează simultan, într-un mod atractiv, ușurând și uneori scurtând etapele necesare însușirii deprinderilor motrice. Studiul s-a efectuat la Școala Gimnazială Baia Sprie, din localitatea Baia Sprie, județul Maramureș. Subiecții sunt elevi din clasele a IV-a, cu vârste cuprinse intre 9-10 ani, iar numărul total de elevi care au luat parte la acest este de 40. Pregătirea generală și înscrierea rezultatelor, precum și experimentul în sine a avut loc în anul școlar 2018-2019. Testările și măsurătorile pentru clasa experiment cat si pentru clasa control au fost făcute cu rigurozitate, în timpul orelor de educație fizică. La începutul anului școlar 2018-2019, în luna septembrie au fost făcute testările inițiale, iar cele finale în perioada 1-25 mai. Metodele de cercetare folosite au fost: observația, experimentul, metoda matematico-statistică, metoda de prelucrare a datelor.

Cuvinte cheie: *educație fizică, jocuri dinamice, dezvoltare fizică armonioasș, dezvoltarea calităților motrice, obiectivele educației fizice.*

Introduction

Among the other school subjects learned by students, Physical Education plays an important part in the development of their personalities, having a profound and long-lasting imprint. Our daily lives are more and more alert and parents have less and less time to spend with their children in parks or playgrounds. The world is modernizing, television and technology is taking over our lives and replaces physical activities that children should be having at this early age. Children become spectators instead of participants.

During a ten-minute game, children do much more effort than in a regular hour. Therefore, games represent the best method to overcome sedentariness in the shortest time being pleasant, attractive and satisfying the need to move at the same time.

In Physical Education terminologies (1973), the game is defined as a complex activity, mainly motor and emotional, which takes place spontaneously following pre-established rules, in a recreation a purpose being also adaptable to social reality (Sabau, 2013:11).

Most games have a multilateral challenge over the organism, but there are also games with a specific destination. At this young age, games represent the main factor in the development of the motor qualities (speed, strength, resistance, skill). These games also develop the moral qualities, having an important role in maintaining and strengthening students' health.

Primary school students have a special interest in sport activities. They want to know a lot of things about them and they also prove to be very capable of a conscious and active contribution to the development their own growth coefficient.

Most children are healthy at this age because they are vaccinated against main diseases. Overweight can cause many health risks among children such as high blood pressure, which is becoming more and more frequent. This can be a genetic problem or it can be influenced by external environment. It is easier to prevent than to treat. Many children don't exercise as much as they should, they don't have enough sports activities (Papalia, Wendkos, Feldman, 2010: 318).

Bearing in mind that at his age games play an important part in a child's daily activities, teachers should use them continuously as a main activity during PE lessons. Its main structure should be built in favour of developing and enlarging the group relationships, educating different qualities and also enhance students' skills and moral behavior, taking into consideration their needs.

Perseverance, patience, courage, initiative, taking into consideration the needs of others, modesty, obeying the rules established in the group, are some of the main objectives to be taken into consideration when choosing games for PE lessons. These rules will be made very clear.

According to Piaget, moral development is accomplished through three stages, as children get from the stiff thinking to a more flexible one (Papalia, Wenkos, Feldman, 2010: 318).

Games are means of organising physical exercises in a well-structured pedagogical process. They are characterized by a conscious activity, which takes place in a relatively freedom of action and assures the possibility of manifesting and educating physical and psychological qualities in a creative manner, in an optimistic atmosphere, well-being and pleasure.

Objectives:

- To conduct initial measurements (height, weight, bust, span) and test the level of motor quality development

- To establish the PE lesson contents for the experiment classes through the selection and usage of specific games
- To conduct measurements (height, weight, bust, span) and test the level of motor quality development both for control and experiment classes.
- To prove that using games during PE lessons in primary classes leads to a harmonious physical development and also the development of motor qualities in an attractive and pleasant manner, with an active participation of the students.

Materials and Methods

The research methods used to conduct this study regarding the optimisation of PE lessons for a harmonious development among fourth grader students by the means of dynamic games are:

1- Observation
2- Experimentation
3- The mathematical and statistical method
4- The statistical mathematical method.

The dynamic games used for this study were: The 30 second race, The race on numbers, Hunters and Ducks, The rolling ball relay, Who transports the handcart faster, The medicinal ball relay, Rooster fight, Change the T-shirt, Ball through the tunnel, The islands, Find you half, The two-ball race, Hunting an object, The third one runs, The train, Transporting the balloon, The Pulling fight, The Guardian of the Bridge, 1,2,3... statue, Rhythm dialog etc.

Tests and measurements:

- 30m Speed, Long jump, Baseball throw, Track 1, Track 2
- Height, Weight, Bust, Span

Figure 1. Track 1

Figure 2. Track 2

The study was conducted between the years 2018-2019. Two classes of four graders, between ages of 9 and 10. The tests and measurements were carried out during the Physical Education lessons. The initial tests were made in September 2018 and the final tests were made in May 2019. These tests consisted in: Control Tests (speed, long jump, baseball throw, track 1, track 2) and Anthropometric Measurements (weight, height, bust, span).

Results

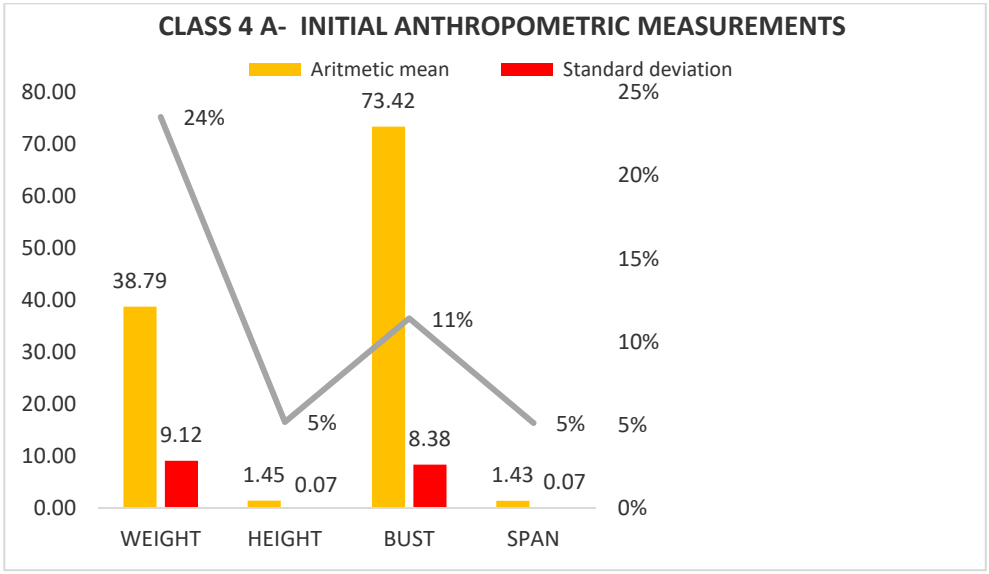

Figure 3. Weight, Height, Bust, Span Control Group A - INITIAL MESUREMENTS

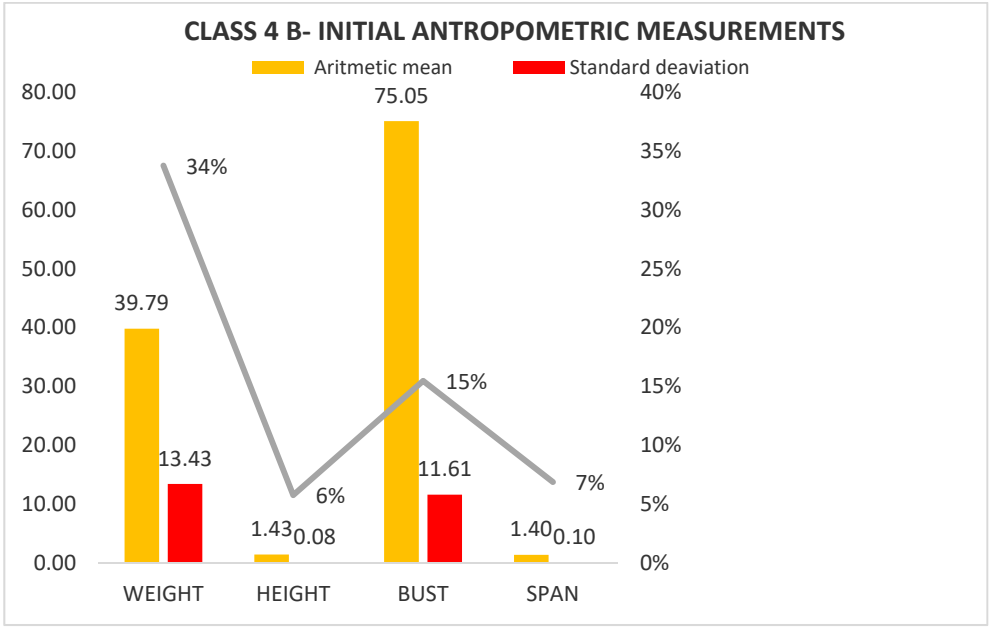

Figure 4. Weight, Height, Bust, Span Control Group B - INITIAL MESUREMENTS

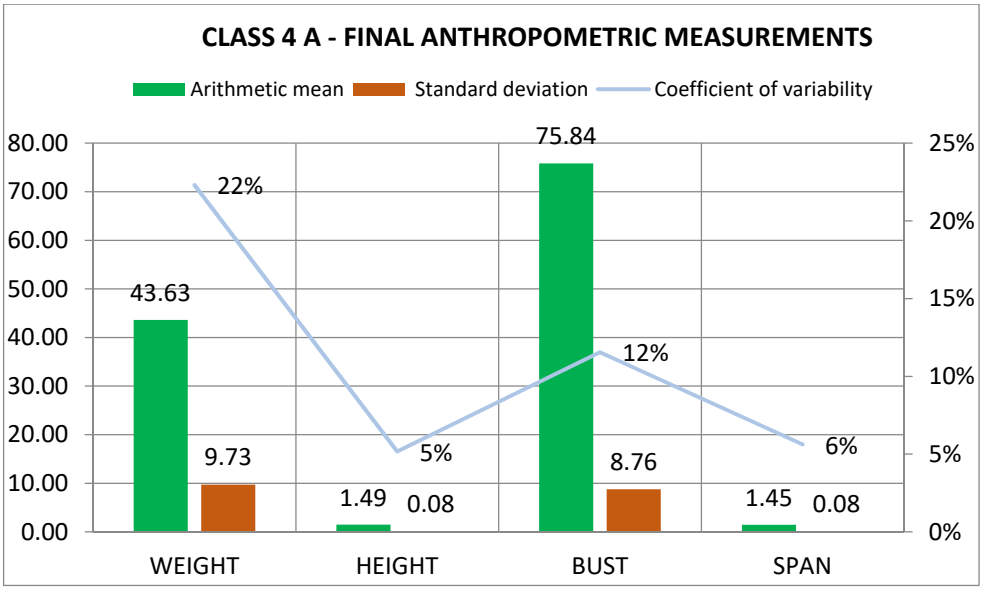

Figure 5. Weight, Height, Bust, Span Control Group A - FINALE MESUREMENTS

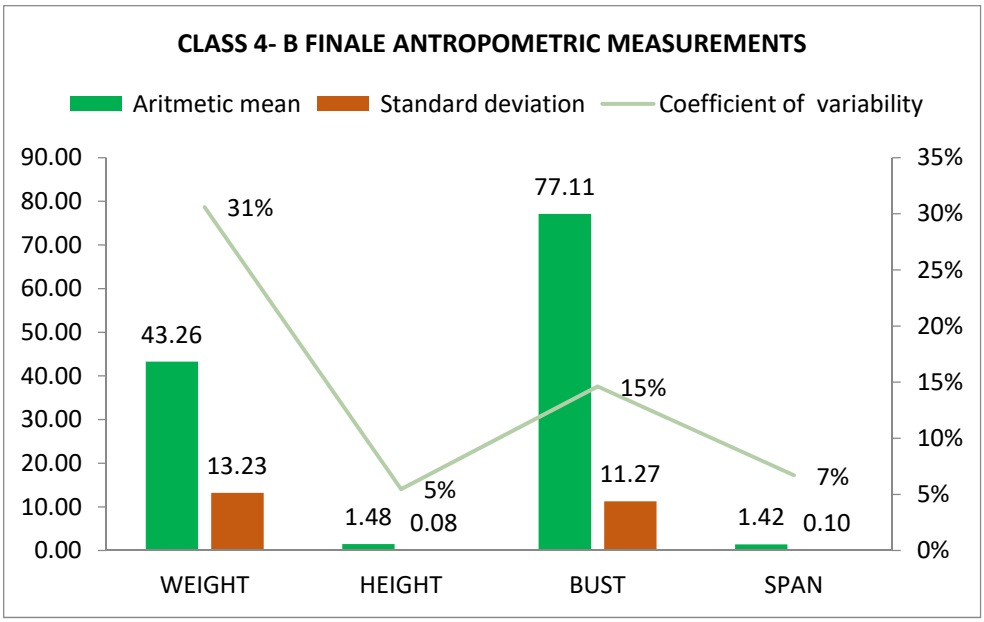

Figure 6. Weight, Height, Bust, Span Control Group B - FINALE MESUREMENTS

The interpretation of the final measurements (height, weight, bust, span)

Control group – class 4B

After conducting the final body measurements showed a heightening with an average of 1.48 cm (five unit higher that the initial tests). The exception standard (0.08) and the variable coefficient (5%) has improved, and the distribution was a significant one.

Weight grew by 3.47 units, from 39.79kg to 43.26 kg. The exception standard of 13.23 and the coefficient of 31% situate the group to a lower means of homogeneity.

The average measurements for the bust were 77.11, the exception standard being 11.27 and the variable coefficient was 15%, showing a good homogeneity.

Regarding the span, the average measurements were 1.42 with an exception standard of 0.10 and a variable coefficient of 7%, results of the group being very good.

Control group – class 4A

The final body measurements of this group turned out to be much better than those of the control group. All body measurements have improved, therefore the average results for height was 1.49, with 4 cm more than the initial tests showed. It is the age when children tend to heighten considerably. The exception standard was 0.08 and the variable coefficient of 5% situated the group to very good homogeneity. The values for weight were 43.63, with 5.94 kg more than in the initial test. The exception standard was 0.08 and the variable coefficient was 22%, which shows a good homogeneity of this group.

Regarding the bust, the measurements showed 77.11, the exception standard being 18.76 and the variable coefficient was 12%, the homogeneity being e very good one.

The span measurements were 1.45, with the exception standard of 0,08 and the variable coefficient 6%, resulting in a very good homogeneity of the group.

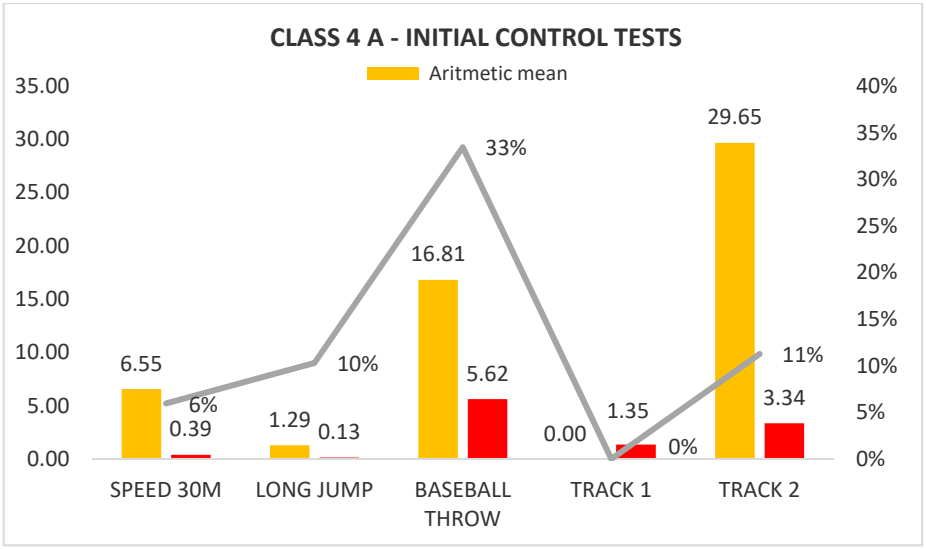

Figure 7. 30m Speed, Long jump, Baseball throw, Track 1, Track 2, Control Group A - INITIAL TEST

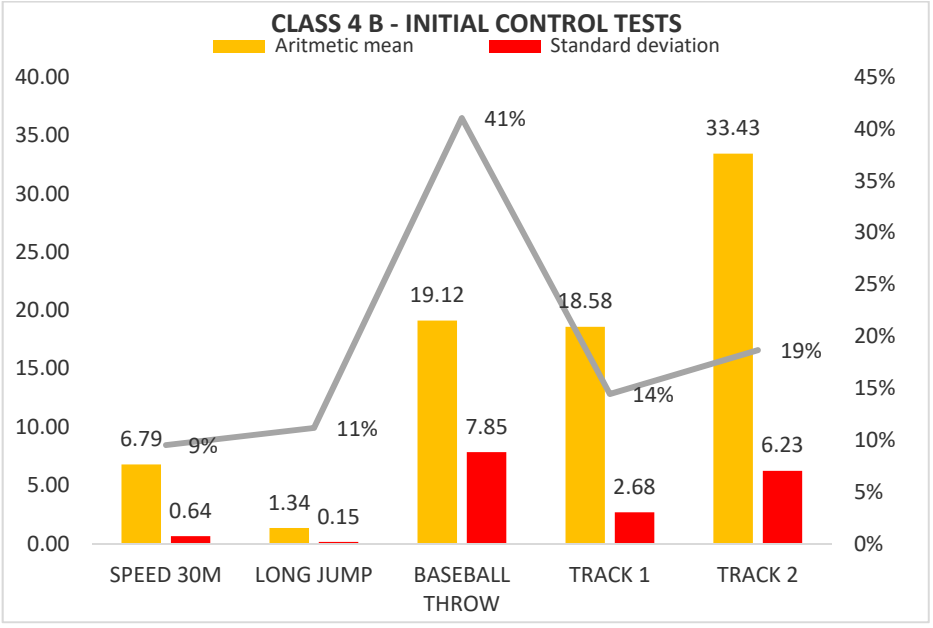

Figure 8. 30m Speed, Long jump, Baseball throw, Track 1, Track 2, Control Group B - INITIAL TEST

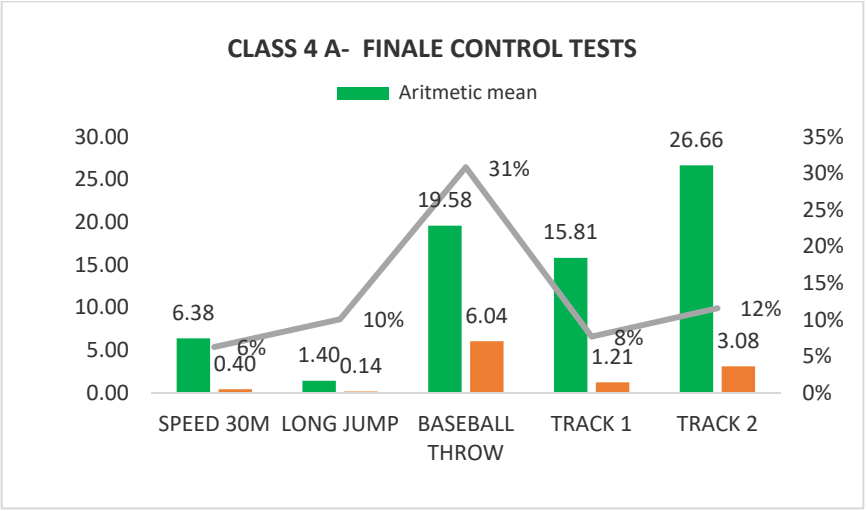

Figure 9. 30m Speed, Long jump, Baseball throw, Track 1, Track 2, Control Group A - FINALE TEST

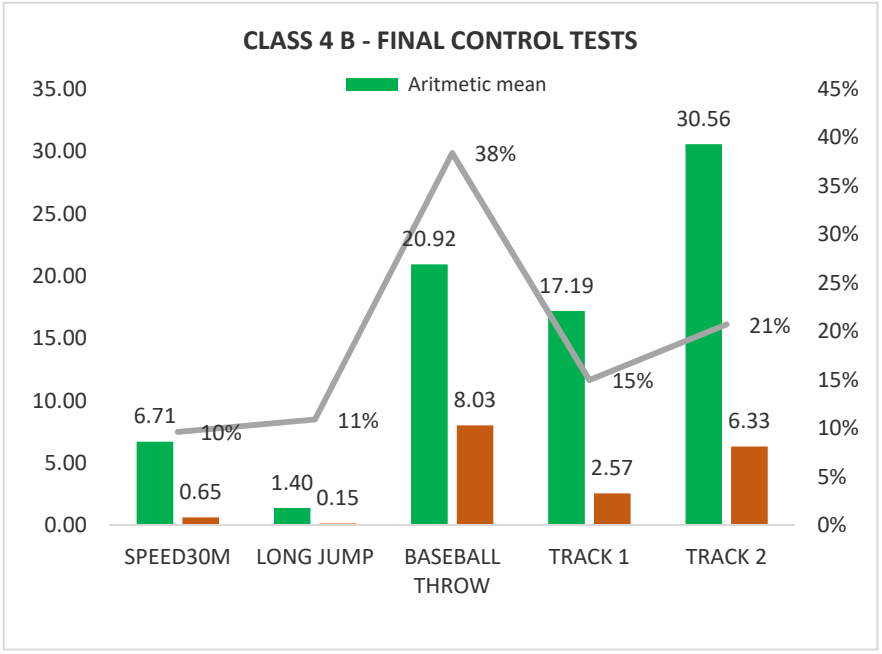

Figure 10. 30m Speed, Long jump, Baseball throw, Track 1, Track 2, Control Group B - FINALE TEST

Discussion

50m Speed, Long jump, Baseball throw, Track 1, Track 2

1. In the 50m speed test, the experiment class (4A) had an average result of 6.55 seconds (in the initial test) and in the final test, an average result of 6.38. The progress was 0.17 seconds. The control class (4B) had an average result of 6.79 seconds and in the final test an average result of 6.71, the progress being of 0.08 seconds.
2. In the long jump initial test =, which was in September, the experiment class (4A) had a result of 1.29m and in the final test it was of 1.40m, showing a progress of 11 cm. the control class (4B) had the average results of 1.34 m in the initial test and 1.40 m in the final test, with a progress of 6 cm but with 5cm less than the experiment class.
3. In the baseball throw test, the experiment class (4A) had an average result of 16.81 m and a final test result of 19.58, having made a progress of 2.27 m. the control class (4B) had an initial average test result of 19.12 m with a final average test result of 20.92, with a progress of 1.76m. The experiment class had a 1.8 m better progress that the control class (where students G.M, I. D and D. M had a much better result than the average result of their group).
4. Track 1 results: this track consisted of five stops, where the experiment class had a result of 16.62 seconds, whereas the control class had a result of 18.58 seconds in the initial tests. The final tests showed that the experiment class had a result of 15.81 seconds (with a progress of 0.8 seconds) and the control class had a result of 17.19 seconds (with a progress of 1.39 seconds). Both classes made a considerable progress, but in this case the experiment class had a small advantage due to their initial test results.
5. Track 2 results: this track consisted of seven stops, where the experiment class had a result of 29.65 seconds in their initial test in comparison to the control class, which had a result of 33.43 seconds. In the final test, the experiment class had a result of 26.66 seconds compared to 30.56 seconds, which was the result of the control class. The progress of the experiment class was by 0.02 seconds better than that of the control class.

Conclusions

Dynamic games have several advantages when it comes to other methods used during PE lessons. Besides the fact that they are various and more attractive, they also offer a great density to it, leading to remarkable changes in the harmonious development of a child along with its manifestation of motrical qualities.

This study shows the obvious progress that has been made both on the harmonious physical development and on the motrical qualities of students, because they attend the PE lessons with a lot of enthusiasm, interest and joy.

In a world where temptations and barriers are a constant threat, sports and physical activities are among the few opportunities where students have the possibility to use their imagination, creativity and self-manifestation.
Taking all these into consideration, games during PE lessons educate students' will, the capacity of decision, responsibility within the group, obeying the rules and suppressing their own eagerness. The positive state of mind as well as the spirit of emulation determined by the game leads to the development of the capacity of making maximum effort with favourable results. Games are the way through which children learn to behave, to grow as human beings and learn how to know themselves and the others through game interaction.

Due to age particularities and nonetheless material possibilities, the PE lessons last less time. Students need a thorough preparedness during PE lessons, skills which they will later use in the years to come. These skill developments can be started as soon as 0 graders and gradually making sure that the quality of the educational process is not lost, thus generating healthy, strong and harmoniously developed children.

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