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## EDITORIAL

# Some general conclusions about physical activities in the annual reports of the Public Health District Authority of Cluj county - Romania 2010–2018

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In the studied time period 2010-2018, the activity of the Public Health District Authority (PHDA) of keeping under control or improving from one year to another the health prevention and health promotion activities in Cluj county - Romania can be observed (1). The methods used comprise specific programs and subprograms as well as information-education means in public health, intended for the sedentary population, adults and children. However, unfortunately, there is an annual percentage increase in the main chronic diseases (or groups of diseases), both in terms of prevalence and medico-social impact. By going deeper into the reports, poor financial support can be evidenced, as well as many methodological errors at all levels, which explains the stagnation or gradual regression of the health of the population in Cluj county. We mention only a few causes of this phenomenon, which can be observed quite easily from the content of the annual reports:

- The reports are not homogeneous, they do not rigorously monitor the same parameters every year, which does not allow observing the annual trends by diseases.

- The reports do not evidence the involvement in health promotion of all actors that assume the mission of promoting and maintaining population health. We refer especially to the Ministry of National Education and the Ministry of Sport, as well as to the many non-profit and limited liability organizations and to the great high

performance sports clubs, which play no role and are not involved in promoting population health.

- In the reports, there is no statistical reference to the sedentary population segment, school-age youth, adults and elderly, from which the annual evolution of this population segment that should normally decrease could be estimated. Here, the decrease in the number of exemptions from exercise in sport classes, as well as the involvement of an increasingly high number of students in physical and sports activities should be aimed at. Collaboration, which is currently lacking, between PHDA and students at faculties of physical education is required.

- It can be seen that the budgets allocated to support local information-education campaigns on public health topics for the duration of one year are extremely low (5000 lei, about 1200 euro).

- No report mentions as part of the recommendations formulated therein the problem of the absence of the Law on health prevention, extremely useful with respect to the actors responsible for population health promotion and the forms of collaboration between entities playing such a role.

These conclusions can be extended and developed in a review article on the same topic, for the benefit of all.

## References

(1) <http://www.dspcluj.ro/> Accessed online: 2019, August.

## ORIGINAL STUDIES

# Warm-up routines: performance assessment following both an active and a combined method in basketball players

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### Abstract

**Background.** Warm-up is defined as a minimum exercise which increases body temperature along with both heart rate and respiratory frequency.

**Aims.** Our objective was to test individual performance during Squad Jump, Stiffness, and Fifteen seconds Vertical Jump Tests based upon the warm-up protocol.

**Methods.** Ten (n=10) competitive male basketball players were included in the study group. The study methodology consisted of three different tests during the specific pre-warm-up routine (C<sub>1</sub>) and general, non-specific (C<sub>2</sub>) warm-up routine, while monitoring: Flight Time (F<sub>t</sub>), Contact Time (C<sub>t</sub>), Target Center along with Power Ratio over Squad Jump, Stiffness, and Fifteen seconds Vertical Jump Tests.

**Results.** During C<sub>1</sub>, STFt, Ct was lower (-0.094%) as against C<sub>2</sub> value (-0.16%), whereas Ft was similar, describing positive changes during C<sub>1</sub> (0.019%) and a drop during C<sub>2</sub> (-0.16%). Yet, Target Center reached 0.040% improvement over C<sub>1</sub>, with a -0.153% drop upon the first repetition during C<sub>2</sub>; Power Ratio changed by 0.175% and -0.116% during C<sub>1</sub> unlike C<sub>2</sub>. Over C<sub>2</sub>, unlike C<sub>1</sub>, improved C<sub>t</sub>, F<sub>t</sub>, Power Ratio and Target Center were obtained due to an increased exercise complexity, through both static and dynamic exercises.

**Conclusions.** Over C<sub>2</sub>, unlike C<sub>1</sub>, improved C<sub>t</sub>, F<sub>t</sub>, Power Ratio and Target Center were obtained due to an increased exercise complexity, through both static and dynamic exercises. However, as seen through overall performance analysis, warm-up volume and intensity can decrease individual performance by minimizing the progress monitored over a linear anaerobic exercise.

**Keywords:** basketball, warm-up, power ratio, performance.

## Introduction

Warm-up routines are performed with specific objectives during physical training. Of them, injury risk reduction while improving individual performance through enhanced functional adaptation is of particular importance (Gogte et al., 2017). Several methods failed to identify differences over a short term period in recreational athletes (McCrary et al., 2015). Each routine is adapted to exercise specificity, whereas differences can be seen between basketball, handball, football, cycling, etc. (Silva et al., 2018).

In team sports, warm-up routines consist of both static and dynamic movement during 5 to 30 minutes time. The activity within consists of individual *active*, *passive* or *combined warm-up* methods. During passive routines, as part of physical training, several functional changes can be reported (Gogte et al., 2017). One of them is related to

injury risk management through both intrinsic and extrinsic factors. Intrinsic factors are described by Frikha et al. (2016) as past injuries, physical anomalies, body weight, sex and age; extrinsic factors are related to the training volume, intensity, training surface, equipment and technique. Warm-up methods tend to reduce extrinsic injury risk factors, through both active and passive methods which effect flexibility, strength and speed along with resistance.

As described by several authors, passive warm-up can increase oxygen release, improving metabolism activity and nerve conduction velocity, while influencing strength, speed, flexibility and coordination (Bishop, 2003a; Bishop, 2003b; Gogte et al., 2017). Still, active methods have different outcomes. According to Samson et al. (2012), increased blood flow, respiratory frequency and heart rate represent normal involuntary changes during active warm-

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up methods, with influence on lactate metabolism and its use during specific or general exercise (McGowan et al., 2015).

Warm-up activities are described in several papers as a minimum exercise which increases body temperature, along with both heart rate (HR) and respiratory frequency (Rf). Yet, several applied methods can induce warm-up with less thermal effect, as seen in passive warm-up routines. The specific routines applied are important in order to increase individual adaptation during exercise. In early times, Gray et al. (2002) confirmed that active warm-up routines have an important role in ATP production, enhancing acetylcarnitine concentration while improving  $O_2$  uptake and limiting lactate accumulation. However, these changes are dependent upon exercise capacity, specificity and volume as well as on warm-up intensity. In the paper of Takizawa et al. (2018), the final outcome regarding individual performance failed to change during passive unlike active warm-up routine.

Several warm-up routines are performed through combined methods. These are characterized by an altered ratio between active and passive methods (Andrade et al., 2015). Basketball represents a complex team sport in which the outcome is dependent upon both technical and tactical actions (Pliauga et al., 2015; Ziv & Lidor, 2010).

## Hypothesis

Based on our hypothesis, during exercise, individual adaptation can be altered in relation to the physical or technical objective within the programmed activity, while influencing force development, coordination and balance.

## Objectives

Our objective was to test the current hypothesis by conducting three different tests during specific pre-warm-up routine and general, non-specific, warm-up routine, while monitoring: Flight Time, Contact Time, Target Center along with Power Ratio over Squat Jump, Stiffness, and Fifteen seconds Vertical Jump Tests.

## Material and method

### Research protocol

We conducted a cross-sectional study on a group of professional basketball players with competitive national senior activity. In order to apply the study methodology, an oral and written consent was obtained from (I.) athletes, (II.) club management, along with (III.) the University Ethical Committee.

#### a) Period and place of the research

The study was conducted during February - March 2019, in Târgu Mureș, Romania.

#### b) Subjects and groups

The study group consisted of 10 competitive basketball players with a reported mean age of  $23.6 \pm 4.45$  years,  $192.1 \pm 9.19$  cm height and  $91.9 \pm 15.56$  kg body weight. In order to be included in the study group, the athletes had to meet the following inclusion criteria: (I.) male basketball player with (II.) general medical acceptance (III.) currently competing at national professional level. The exclusion criteria were: (I.) medical incompatibility with the pre-determined training program or testing program, (II.) health condition/s preventing the study activity or individual health.

#### c) Tests applied

The study was conducted over seven ( $n=7$ ) days. The mentioned period was divided into two conditions, described

as Condition 1 ( $C_1$ ) and Condition 2 ( $C_2$ ). Each condition ( $C_1 - C_2$ ) represented a different warm-up protocol, the outcome of which was tested by using three physical tests ( $n=3$ ), applied one single time while measuring four main ( $n=4$ ) parameters: Flight time (s), Contact Time (s), Target Center (cm) along with Power Ratio (W/ kilo).

### Warm-up protocol during $C_1$ and $C_2$

$C_1$  was conducted during the first training of the day, after 12 hours recovery time and 24 hours low-intensity training. During  $C_1$  the warm-up length was 8 minutes, by applying the following exercises: (1) 3 minutes running with the basketball ball between the 2 baskets and (2) 5 minutes continuous run on half of the court with a lay-up finish each time (3);  $C_2$  was applied 48 hours after  $C_1$ , in similar conditions. The warm-up length increased while conducting the following exercises: (1) 3 minutes running along the court, (2) Dynamic stretching over half of the court ( $\times 8$  repetitions), (3) 6 minutes static stretching (gymnastics), (4) Running exercises up to half the court by performing Forward Lunges, High Knees, Butt Kicks, Carioca ( $2 \times$ ).

### Performance measurement tests

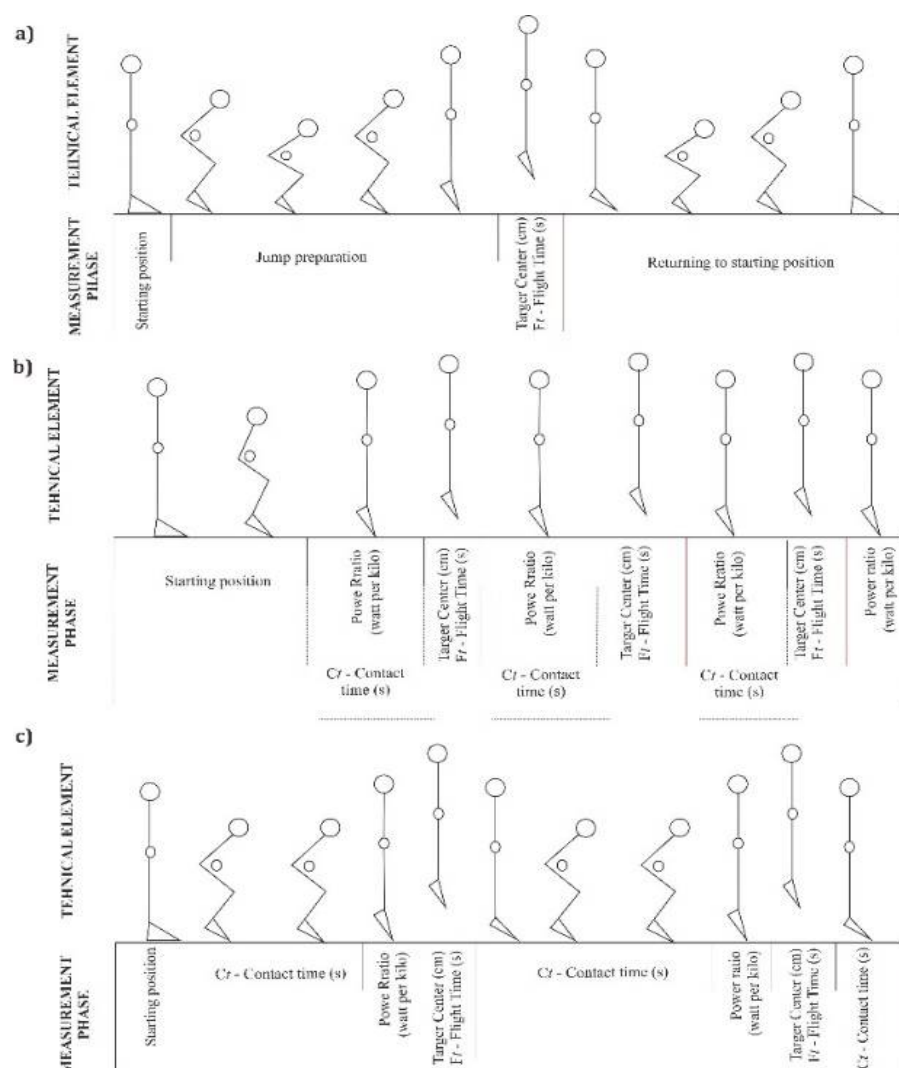
Due to both  $C_1$  and  $C_2$  warm-up methods conducted 48 hours apart, three specific tests were applied to assess individual performance: (1) Squat Jump Test (SJt), (2) Stiffness Test (STFt) and (3) Fifteen seconds Vertical Jump Test (15sJt). The tests were performed by using the OptoJump System device (Microgate, Bolzano, Italy), each lasting according to the testing methodology. During all three tests, the parameters of interest were: Flight Time (Ft, seconds), Contact Time (Ct, seconds), Target Center (cm) and Power Ratio (Watt per kilo, W/kilo), as seen in Fig. 1.

Testing was conducted in similar environmental conditions,  $20^\circ\text{C}$  environmental temperature, 70% humidity. To conduct the tests, the subjects positioned themselves between the two arms of the OptoJump System device. The tests were carried out successively with a 2 minute pause between them, while respecting the following order: (I.) SJt, (II.) STFt and (III.) 15sJt; the testing principle evolved from low towards an increased testing volume. During each repetition, the device recorded the parameters of interest. Monitoring was performed in real time, stored and further analyzed.

SJt objective was to evaluate explosive force, over one single jump ( $n=1$ ) starting from a Squat position, with the arms placed on the hips, legs wide apart with no counter movements. STFt objective was to evaluate reactive force by performing seven consecutive jumps ( $n=7$ ) while maintaining the knees straight. The starting position was similar to SJt, the arms placed on the hips and the legs close apart. 15sJt objective was to measure anaerobic power over 15 seconds of continuous exercise. Several jumps were executed during 15 seconds time by starting the test from a standing position and performing successive jumps with the arms placed on the hips, legs wide apart and no counter movements.

### d) Statistical processing

SPSS 20 software was used in order to analyze the current data. The level of significance was pre-set at  $\alpha=0.05$ . Normal distribution was assessed by using Shapiro-Wilk test, whereas descriptive data are illustrated such as  $\text{mean} \pm \text{SD}$ . The paired samples T test was used in order to identify the main changes between  $C_1$  and  $C_2$ .



**Fig. 1** – Graphic representation of the performance evaluation methods: (a.) SJt, (b.) STFt and (c.) 15sJt

Note: SJt = Squat Jump Test; STFt = Stiffness Test; 15sJt = Fifteen seconds Vertical Jump Test.

Before each test, the athletes resumed the testing methodology in order to avoid any pauses during exercise and to comply with the main technical regulations.

## Results

A mean body weight of  $91.9 \pm 15.56$  kg and a mean height of  $192.1 \pm 9.19$  cm were measured in the study group. General performance over both  $C_1$  and  $C_2$  was described through  $Ft$ ,  $Ct$ , Target Center, along with the Power Ratio, as seen in Table I. Of the three tests, SJt failed to include  $Ct$  and Power Ratio measurements due to one single jump

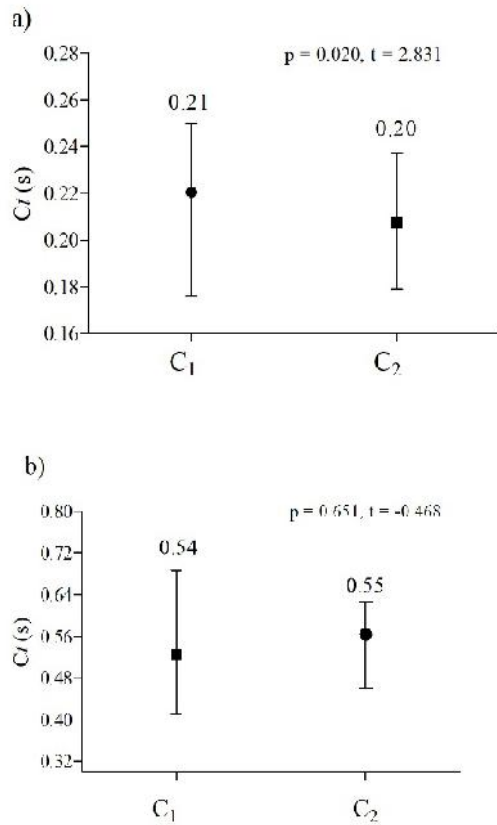
as against STFt and 15SJt protocols, which consisted of several jumps over a different period length.

### $Ct$ changes over $C_1$ and $C_2$

$Ct$  changes were measured over STFt and 15sJT tests, but not SJt. During  $C_1$ , STFt,  $Ct$  mean value was 0.21 s, whereas over 15sJT, the value reached 0.54 s, as seen in Fig. 2.

**Table I**  
General performance illustration over both  $C_1$  and  $C_2$  measurements, during SJt, STFt, 15sJt.

Performance parameters	Mean value $\pm$ SD		
	SJt	STFt	15sJt
$Ct$	-	$0.21 \pm 0.02$	$0.54 \pm 0.06$
$Ft$	$0.57 \pm 0.03$	$0.50 \pm 0.05$	$0.49 \pm 0.04$
Target center	$40.75 \pm 4.72$	$31.8 \pm 7$	$31.21 \pm 4.79$
Power ratio	-	$42.41 \pm 9.71$	$23.56 \pm 2.91$



**Fig. 2** – Ct differences over  $C_1 - C_2$ , during STFT (a.) and 15sJT (b.), represented as mean values

Significant statistical changes resulted between  $C_1$  and  $C_2$  regarding Ct value, during STFT,  $C_2$  ( $p = 0.020$ ), whereas during 15sJT,  $C_2$ , performance reached a higher value, without a significant difference ( $p = 0.651$ ), as illustrated in both Fig. 2. and Table II.

#### *Ft changes over $C_1$ and $C_2$*

Ft, as against Ct, was measured during all three tests. Using the  $C_1$  and  $C_2$  methods, significant differences were identified. Ft, during SJT, over  $C_1$ , reached a mean value of 0.55 s, whereas during  $C_2$ , a mean value of 0.59 s was found ( $p = 0.01$ ). Similar results were obtained over STFT, 0.46 s. vs. 0.54 s. mean values ( $p = 0.01$ ) between  $C_1$  and  $C_2$ , whereas during 15sJT, 0.46 s vs. 0.52 s ( $p = 0.01$ ) were recorded, as detailed in Table III.

#### *Target Center changes over $C_1$ and $C_2$*

Similarly to Ft, Target Center was measured during all three tests. Differences were monitored during both  $C_1$  and  $C_2$  warm-up protocols. During  $C_1$  stage, SJT Target Center reached 38.14 cm, while 43.36 cm was the mean value for  $C_2$  ( $p = 0.01$ ) warm-up method. Further on, the same parameter, over STFT, reached 27.07 cm during  $C_1$ , with a significant difference ( $p = 0.01$ ) for  $C_2$  measurement, 36.68 cm. Similar changes were monitored during 15sJT test, as detailed in Table IV.

**Table II**  
Ct statistical differences over  $C_1 - C_2$ , during STFT (a.) and 15sJT (b.)

Test type	Ct (mean±SD)		p	t	95% CI	
	$C_1$	$C_2$			Lower	Upper
STFT	0.21±0.02	0.20±0.02	0.020**	2.83	0.001	0.017
15sJt	0.54±0.08	0.55±0.04	0.651*	-0.46	-0.061	0.040

**Table III**  
Ft statistical differences over  $C_1 - C_2$ , during SJT, STFT and 15sJT tests.

Test type	Ft (mean±SD)		p	t	95% CI	
	$C_1$	$C_2$			Lower	Upper
SJt	0.55±0.3	0.59±0.02	0.0001**	-5.806	-0.512	-0.022
STFT	0.46±0.04	0.54±0.03	0.0001**	-6.217	-0.106	-0.049
15sJt	0.46±0.02	0.52±0.03	0.0001**	-8.401	-0.074	-0.042

**Table IV**  
Target Center statistical differences over  $C_1 - C_2$ , during SJT, STFT and 15sJT tests.

Test type	Target Center (mean±SD)		p	t	95% CI	
	$C_1$	$C_2$			Lower	Upper
SJt	38.14±4.12	43.36±3.85	0.0001**	-5.99	-7.189	-3.250
STFT	27.07±5.31	36.68±5.23	0.0001**	-6.40	-12.99	-6.21
15sJt	43.36±3.85	34.75±3.65	0.0001**	-4.18	-5.24	-1.55

Table V

Statistical differences regarding Target Center over  $C_1 - C_2$ , during STFT and 15sJT tests

Test type	Target Center (mean±SD)		P	t	95% CI	
	$C_1$	$C_2$			Lower	Upper
STFT	36.08±6.34	48.75±8.35	0.0001	-7.32	-16.58	-8.75
15sJt	21.86±2.22	25.26±2.55	0.002	-4.18	-5.24	-1.55

Table VI

Performance reduction in successive activities, illustrated as mean±SD data, for both  $C_1$  and  $C_2$  methods

Test type	Parameters of interest	Mean value±SD		p	t	95% CI	
		$C_1$	$C_2$			Lower	Upper
STFT	Ft, s	0.05±0.07	-0.12±0.08	0.0001	6.489	0.116	0.240
	Ct, s	-0.08±0.11	-0.16±0.10	0.197	1.394	-0.461	0.194
	Target Center, cm	0.11±0.16	-0.10±0.12	0.002	4.411	0.103	0.320
	Power Ratio, w/kilo	0.16±0.15	-0.08±0.12	0.0001	5.248	0.145	0.364
15sJt	Ft, s	0.01±0.08	2.60±8.30	0.350*	-0.986	-8.529	3.352
	Ct, s	-0.07±0.21	0.04±0.18	0.235	-1.273	-0.331	0.092
	Target Center, cm	0.03±0.18	-0.05±0.15	0.280	1.149	-0.083	0.257
	Power Ratio, w/kilo	0.11±0.22	-0.05±0.08	0.046	2.309	0.003	0.351

#### Power Ratio changes over $C_1$ and $C_2$

During STFT, the mean power reached 36.08 W/kilo, while a value of 21.86 W/kilo was measured over 15sJt, as illustrated in Fig. 3. In comparison, during  $C_2$ , significant changes were measured on both STFT Power Ratio: 48.75 W/kilo ( $p = 0.01$ ) and 15sJt Power Ratio: 25.26 W/kilo ( $p = 0.02$ ) (Table V).

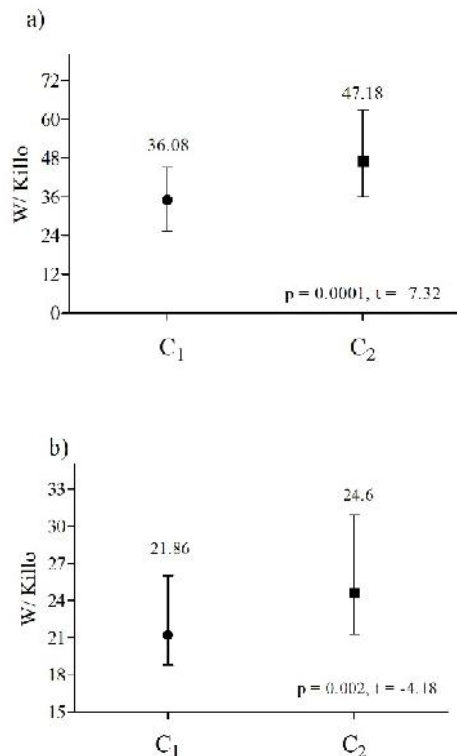


Fig. 3 - Power Ratio differences over  $C_1 - C_2$ , during STFT (a.) and 15sJT (b.), represented as mean values

#### Overall performance during $C_1 - C_2$

Overall performance was detailed for  $C_1$  and  $C_2$  warm-up methods. The following analysis was performed by measuring performance reduction in successive repetitions during: STFT and 15sJt tests (Table VI). During  $C_1$ , STFT, Ct was lower (-0.094%) as against  $C_2$  value (-0.16%), while Ft was similar, describing positive changes during  $C_1$  (0.019%) and a drop during  $C_2$  (-0.16%). Yet, Target Center reached a 0.040% improvement over  $C_1$ , with a -0.153% drop upon the first repetition during  $C_2$ ; Power Ratio changed by 0.175% and -0.116% during  $C_1$  unlike  $C_2$ . Different measurements were obtained in 15 sJt test for Ft (-0.007 vs. -0.056%), Ct (-0.036 vs. 0.062%), Target Center (-0.130 vs. -0.117%) and Power Ratio (0.154 vs. -0.069%) during  $C_1$  as against  $C_2$  ( $p > 0.05$ ).

#### Discussion

Following the study methodology, both warm-up protocols were dynamic, taking into account the level of active exercise. The main objective over  $C_1$  and  $C_2$  was to improve individual adaptation following the specific performance jump test. The  $C_1$  as against  $C_2$  method limited Ft ( $p = 0.01$ ), Power Ratio ( $p = 0.01$ ), Target Center ( $p = 0.01$ ) and Ct ( $p = 0.20$ ). Yet, exercise continuity, based on the study methodology, described a performance drop starting from the first measurement of each test during  $C_1$  as against  $C_2$ .

#### Active warm-up methodology conducted through $C_1$ and $C_2$

Similarly to other research papers conducted with a similar objective, exercise intensity has a major impact upon individual adaptation and warm-up objective (Bishop, 2003a; Fradkin et al., 2010). An important inter-individual variability was reported by the study of both female and male athletes (Monteiro et al., 2016). Anywise, in both groups, the main outcome based on active warm-

up methods is an increased blood flow, which can increase both respiratory frequency and heart rate, improving lactate metabolism, as seen in the study of Wahl et al. (2010). Taking into account our methodology, both conditions ( $C_1$  and  $C_2$ ) included running, while inducing similar functional changes. Yet, the final result was different, with an improved activity result due to  $C_2$  as against  $C_1$  method. Similar results were identified, but only using passive as against active warm-up methods, concluding that high oxidative ATP is obtained through warm-up at the start of the main training activity (Gray et al., 2001). Avelar et al. (2012) distinguished the following methods and objectives focusing on injury prevention, unlike our objective involving individual performance parameters.

According to Wahl et al. (2010), the use of external devices can be taken into account to ensure optimal warm-up and improve anaerobic performance. In our methodology, no device was used to improve individual performance. Anywise, it will be important to characterize individual progress along the main training activity following such a warm-up method, taking into account that Park et al. (2018) proved in their work that free weight warm-up can improve individual performance. According to O'Sullivan et al. (2009), the warm-up protocol should be both general and specific to the individual field position. Stevanovic et al. (2019) studied specific movement along the court, but failed to identify differences of the used methods compared to our non-specific field position outcomes.

Pagaduan et al. (2012) brought into discussion the use of speed during warm-up routines, similar to our protocol. However, as a result of both static and dynamic methods, sprint time failed to change, whereas an improvement was obtained due to static warm-up, unlike our results in which combined warm-up methodology, during  $C_2$ , improved the main anaerobic parameters. In the study of Kendall et al. (2017), an important change in anaerobic performance following static warm-up compared to no warm-up routine was obtained. Still, individual progress failed to be measured through overall performance, while claiming that static routines are important following high-intensity exercise.

Several papers which used exercise as a performance indicator followed a different methodology. In specific basketball activity, power is an important parameter studied, as shown in both our papers and several other publications (Gonzalez et al., 2013; Pojskić et al., 2015; De Sousa Fortes et al., 2018). Yet, different results were obtained taking into account that basketball has several technical elements which are dependent upon power. According to Bishop (2003b), static activity can improve power ratio, while our study protocol consisted of a combined warm-up protocol, during  $C_2$ . McMillan et al. (2006) reported an improved power due to a dynamic program, similar to our methodology, but different from other papers which failed to determine a performance improvement (Bishop & Middleton, 2013).

#### *Overall performance*

Physical performance following a warm-up method is important. Based on our results, individual performance can be insecure upon dynamic, anaerobic exercise. This state is proved through  $C_1$  unlike  $C_2$  improvement during

the tests. Other publications failed to identify overall performance (Blazeovich et al., 2018). A performance drop could be related to static warm-up routines (Blazeovich et al., 2018), whereas in our study no similar methods were applied. However,  $C_2$  intensity was similar to  $C_1$  (75%  $HR_{max}$ ), while exercise time was different, with an increased volume during  $C_2$ . We believe that  $C_2$  volume was higher relative to intensity. Therefore, a drop in performance was obtained during  $C_2$  unlike  $C_1$ , proven by  $Ft$  (-0.08 vs. 0.03%),  $Ct$  (-0.05 vs. -0.08), Power Ratio (-0.07 vs. 0.14%), along with Target Center (-0.07 vs. 0.07%) during STFt and 15sJt tests.

According to the available data, several methodology improvements are needed in order to conclude the current outcomes. Among them, the (I.) number of subjects, (II.) technical performance analysis, (III.) lactate measurement, (IV.) electromyography (EMG) use in order to assess muscle fiber activation and exercise intensity. In the current study, the mentioned methodology improvements are considered study limitations.

## **Conclusions**

1. Over  $C_2$ , unlike  $C_1$ , an improvement in  $Ct$ ,  $Ft$ , Power Ratio and Target Center was obtained due to an increased exercise complexity, through both static and dynamic exercises.
2. As shown by overall performance analysis, warm-up volume and intensity can decrease individual performance by minimizing performance during a linear anaerobic exercise.
3. Both warm-up volume and intensity seem to influence individual performance during specific or non-specific exercise.
4. In order to conclude the current findings and improve the use of various warm-up methods over individual adaptation, performance and injury risk, several methodology improvements are needed.

## **Conflicts of interest**

The authors declare no conflict of interest.

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## Effect of paliperidone treatment and exercise in experimental depression

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### Abstract

**Background.** Depression is a mental disorder that has an important place among both psychiatric and non-psychiatric disorders.

**Aims.** We aimed to study, in an experimental model of depression induced in rats, the effects of an atypical antipsychotic associated with exercise on emotional and locomotor behavior.

**Methods.** The research was conducted in 4 groups of animals, divided as follows: group I – control animals, group II – animals with reserpine-induced depression, group III – animals with reserpine-induced depression and paliperidone administration, group IV – animals with reserpine-induced depression, paliperidone administration and exercise.

**Results.** Reserpine, used experimentally as a depression-inducing pharmacological agent, determines an increase in emotional behavior and a decrease in locomotor activity. Treatment with paliperidone (an atypical antipsychotic) in sedentary animals with experimental depression induces an increase in emotional behavior and a decrease in locomotor activity. Treatment with paliperidone in exercise-trained animals with experimental depression determines a moderate increase in emotional behavior and the maintenance of locomotor activity within normal limits.

**Conclusions.** Exercise has favorable effects on locomotor activity in depressed animals treated with an atypical antipsychotic.

**Keywords:** depression, reserpine, paliperidone, open field test, exercise

### Introduction

Depression is considered to be a mental disorder that has an important place among both psychiatric and non-psychiatric disorders.

The World Health Organization estimates that depression affects about 121 million people and that by 2020 it will rank second in terms of prevalence, after cardiovascular diseases (\*\*\*, 1998; Amato et al., 2081; West, 1992).

The disease may occur at any time of life, in children, adults and elderly. Prevalence is between 10-25% for women and 5-12% for men. The onset of major depressive disorder is in a 50% proportion between 20 and 50 years, with a mean onset of 40 years. Recent data report a decrease in the age of onset, even up to 20 years. After 50-65 years of age, the rate of depression is equal for the two sexes.

The most affected population groups are those that are socioprofessionally active (Prelipceanu, 2011).

Major depression is associated with a high percentage of mortality by suicide, 10-15% (Chapman & Perry, 2008).

Major depressive disorder is a common, chronic, recurrent, debilitating mental disorder, which leads to significant impairments of personal functional abilities.

Depression is a multicausal affective disorder, characterized by mood changes: sadness, discouragement, despair, inability to focus, sleep and appetite disorders, apathy, feelings of guilt, fatigue or low energy, weight changes, recurrent death and suicide ideas, psychomotor disorders. Major depressive disorder (MDD) – unipolar or bipolar depression – may have several forms: MDD with psychotic factors, melancholy, atypical depression, postpartum depression, treatment-resistant depression, depressive disorder with catatonic factors (Prelipceanu,

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2011; Chapman and Perry, 2008).

Antidepressants (AD) are drugs effective in the treatment of affective disorders and anxiety, which can improve or normalize altered mood in depression.

According to ICD-10, depressive disorders include: mild, moderate, severe depressive episode with/without psychotic symptoms; recurrent depressive disorder; depressive episode in bipolar affective disorder.

The action mechanism of AD is based on the involvement of the following neurotransmitter systems: noradrenergic, serotonergic, dopaminergic and GABAergic.

The biochemical hypotheses regarding the etiopathogeny of depression are the hypothesis of monoamines (NA and 5-HT deficits) and the hypothesis of the imbalance between transmission pathways (hypo-NAergic and hyper-5-HTergic).

AD can be classified pharmacologically according to: the chronological criterion (first- and second-generation AD, which have similar efficacy, but different and unfavorable side effects); action on neurotransmitters (single-action AD and dual-action AD).

The therapeutic choice of a certain AD should meet the following criteria: safe administration, tolerance, rapidity of the effect, clinical experience, risk of side effects, comorbidities (Preliceanu, 2011; Gheorghe, 2007).

*Pharmacological treatment* involves augmentation strategies, therapeutic combinations, therapeutic conversion and better results compared to monotherapy.

Augmentation strategies are aimed at improving the pharmacological effect and clinical efficiency of the administered AD, at avoiding psychic dependence and ensuring continuity.

Augmentation studies have assessed augmentation by: administration of lithium salts, thyroid hormones (triiodothyronine) or concomitant administration of buspirone, bupropion, pindolol; association of atypical antipsychotics: risperidone, olanzapine, clozapine; association with other types of AD such as: reboxetine, mirtazapine (Gheorghe, 2007).

The objectives of therapeutic combinations are an improvement of therapeutic efficacy, an acceleration of the antidepressant effect, the possibility of continuing the administration of the initial AD.

Therapeutic conversion is made by administering a pharmacological preparation, in case of no response to an initial AD. Conversion studies have evaluated: conversion of a tricyclic antidepressant (TAD) to another TAD; conversion of a TAD to a heterocyclic AD; conversion of a tricyclic or heterocyclic AD to a selective serotonin reuptake inhibitor (SSRI); conversion of a SSRI to a TAD (Gheorghe, 2007).

The aim of therapeutic conversion is to continue initial treatment with a single AD, to improve long-term therapeutic response, to ameliorate therapeutic adherence, to rapidly improve target symptoms.

Administration of mood regulating substances (lithium salts, carbamazepine, valproic acid salts) has a role in normalizing mood.

*Non-pharmacological treatment* is used in the case of patients with treatment-resistant depression, with partial or unsatisfactory response (therapeutic non-responders)

(Preliceanu, 2011; Gheorghe, 2007; Bruja, 2014; Goldberg, 2001; Micluția, 2010).

The non-pharmacological forms used are: cognitive-behavioral psychotherapy, in association with AD; repetitive transcranial magnetic stimulation, in association with an AD; vagus nerve stimulation; electroconvulsive therapy, in severe disorders with high risk of suicide; moderate exercise; antidepressant preparations used in traditional Eastern Asian medicine; light therapy, in depression with seasonal features.

## Objectives

We aimed to study, in an experimental model of depression induced in rats, the effects of an atypical antipsychotic – paliperidone – associated with exercise on emotional and locomotor behavior.

## Hypothesis

The use of atypical antipsychotics for the augmentation of pharmacological treatment in depression and the role of exercise in the improvement of depression led us to study the effects of an atypical antipsychotic and exercise in depressive disorder.

## Material and methods

The studies were conducted in the Experimental Research Laboratory of the Physiology Department of “Iuliu Hațieganu” University of Medicine and Pharmacy Cluj-Napoca, with the approval of the Committee of Bioethics and the Sanitary Veterinary Authority Cluj-Napoca, regarding the protection of animals used for experimental and scientific purposes.

### Research protocol

#### a) Period and place of the research

The studies were performed on white male Wistar rats, aged 4 months, with a weight of 200-250 g, from the animal facility of the “Iuliu Hațieganu” University of Medicine and Pharmacy Cluj-Napoca. Throughout the duration of the research - 1 October - 30 November 2018, the animals were kept under adequate *vivarium* conditions: temperature, humidity, lighting, feeding and hydration. At the end of the experiment, the animals were euthanized with ketamine.

#### b) Subjects and groups

The animals were assigned to four groups (G) (n = 10 animals/group), as follows:

- G I – control animals, which were administered 5 ml/kg body weight/24 h physiological serum for 14 days
- G II – animals with depression induced by reserpine (DIR), 1 mg/kg body weight/24 h, administered intraperitoneally for 14 days
- G III - animals with DIR and paliperidone, 0.5 mg/kg body weight/24 h, administered intraperitoneally for 14 days, after induction of depression
- G IV – animals with DIR, paliperidone administration and exercise training by the swimming test, for 14 days

#### c) Tests applied

The research calendar, by objectives, days and tests applied, included:

- induction of depression T<sub>0</sub>-T<sub>14</sub> by reserpine (the preparation used was Reserpinum, Sigma) (Arora &

Chopra, 2013; Ruiz et al., 2018)

- control of depression  $T_{11}$  based on the tail suspension test, for antidepressant activity - TST (Steru et al., 1985)

- treatment program  $T_{15}$ - $T_{30}$  with paliperidone administration (the preparation used was Invega<sup>R</sup>, Janssen-Cilag SpA, Italy)

- treatment program  $T_{15}$ - $T_{30}$  with paliperidone and exercise by the swimming test, according to Nayanatara et al., 2005, one hour daily

- control of therapy -  $T_{30}$  by the open field test (OFT), according to Denenberg & Whimby, 1963, to test spontaneous emotional and locomotor behavior, hyperactivity, exploring behavior in an open space and induced anxiety.

#### d) Statistical processing

Statistical analysis was performed with StatsDirect v.2.7.2 software. The results were graphically represented using Excel application (Microsoft Office 2010).

## Results

### a) Comparative statistical analysis for depressive behavior (Table I)

The statistical analysis of the tail suspension test (TST) values showed:

- considering the 4 studied groups of rats

○ at time  $T_0$  – no statistically significant differences between the groups ( $p > 0.05$ )

○ at times  $T_{14}$  and  $T_{30}$  – highly statistically significant differences between at least two of the groups ( $p < 0.001$ )

- considering the 3 studied time points

○ in group I – no statistically significant differences between the studied time points ( $p > 0.05$ )

○ in groups II, III and IV – highly statistically significant differences between at least two of the time points ( $p < 0.001$ )

The statistical analysis of TST values evidenced the following for unpaired samples:

- at time  $T_0$  – no statistically significant differences between the groups ( $p > 0.05$ )

- at time  $T_{14}$  – highly statistically significant differences between groups I-II, I-III and I-IV ( $p < 0.001$ )

- at time  $T_{30}$  – highly statistically significant differences between groups I-II, I-III, I-IV, II-III and II-IV ( $p < 0.001$ ) and statistically significant differences between groups III-IV ( $p < 0.05$ )

The statistical analysis of TST values evidenced the following for paired samples:

**Table I**

Comparative analysis for TST values in the studied groups and statistical significance (values in seconds)

Time	Group	Mean ± SD	Statistical significance (p)					
T0	I	3 ± 0.8165	T0-T14-T30		I-II-III-IV		T0-T14	0.75
	II	2.7 ± 0.8233	I	0.6624	T0	0.2253	I	T0-T30 0.4609
	III	2.9 ± 0.9944	II	< 0.0001	T14	< 0.0001	T14-T30	0.6875
	IV	3.6 ± 0.9661	III	< 0.0001	T30	< 0.0001	T0-T14	0.002
T14	I	3.1 ± 0.7379	IV	< 0.0001			II	T0-T30 0.002
	II	12 ± 1.4907	T0		T14	T30	T14-T30	0.0027
	III	12.3 ± 1.3375	I-II	0.5894	< 0.0001	< 0.0001	T0-T14	< 0.0001
	IV	13.6 ± 1.9551	I-III	0.9542	< 0.0001	< 0.0001	III	T0-T30 0.002
T30	I	3.3 ± 0.8233	I-IV	0.2246	< 0.0001	< 0.0001	T14-T30	0.0488
	II	15.4 ± 1.7764	II-III	0.7048	0.6414	0.0007	T0-T14	< 0.0001
	III	8.9 ± 3.3483	II-IV	0.0526	0.0544	< 0.0001	IV	T0-T30 < 0.0001
	IV	10.4 ± 1.075	III-IV	0.1278	0.0997	0.0395	T14-T30	0.0003

**Table II**

Comparative analysis for open field test values and statistical significance (values in seconds)

Group	Score	Time	Mean ± SD	Statistical significance (p)										
				T <sub>14</sub> -T <sub>30</sub>	II	III	IV	T <sub>14</sub> -T <sub>30</sub>	II	III	IV			
I	ES	T <sub>0</sub>	8.5 ± 1.1785	Emotional score (ES)	T <sub>14</sub> -T <sub>30</sub>	II-III-IV	0.1028	T <sub>14</sub> -T <sub>30</sub>	< 0.0001	II-III-IV	< 0.0001			
	LS		34.4 ± 4.0879									0.0195	0.4679	0.0016
II	ES	T <sub>14</sub>	11.8 ± 1.6193		T <sub>14</sub>	II-III-IV	0.0001	T <sub>14</sub>	I-II	< 0.0001				
		T <sub>30</sub>	9.9 ± 0.8756								I-III	< 0.0001		
	LS	T <sub>14</sub>	25.6 ± 1.7127								I-IV	< 0.0001	I-IV	0.0649
		T <sub>30</sub>	18.2 ± 1.6193								II-III	0.0594	II-III	0.7457
III	ES	T <sub>14</sub>	10.6 ± 0.9661		T <sub>14</sub>	II-IV	0.6319	T <sub>14</sub>	II-IV	< 0.0001				
		T <sub>30</sub>	10.3 ± 0.9487								III-IV	0.0652	III-IV	< 0.0001
	LS	T <sub>14</sub>	25.2 ± 1.4757								I-II	0.0192	I-II	< 0.0001
		T <sub>30</sub>	28.8 ± 2.8206								I-III	0.0033	I-III	0.0012
IV	ES	T <sub>14</sub>	11.5 ± 1.0801		T <sub>30</sub>	I-IV	0.3594	T <sub>30</sub>	I-IV	0.9601				
		T <sub>30</sub>	9.1 ± 1.4491								II-III	0.4684	II-III	< 0.0001
	LS	T <sub>14</sub>	30.9 ± 1.8529								II-IV	0.2435	II-IV	< 0.0001
		T <sub>30</sub>	33.7 ± 2.0575								III-IV	0.0419	III-IV	0.0002

Legend: ES – emotional score, LS – locomotor score

- in group I – no statistically significant differences between the time points ( $p > 0.05$ )
- in group II – highly statistically significant differences between  $T_0$ - $T_{14}$ ,  $T_0$ - $T_{30}$  and  $T_{14}$ - $T_{30}$  ( $p < 0.01$ )
- in group III – highly statistically significant differences between  $T_0$ - $T_{14}$  ( $p < 0.001$ ), very statistically significant differences between  $T_0$ - $T_{30}$  ( $p < 0.01$ ) and statistically significant differences between  $T_{14}$ - $T_{30}$  ( $p < 0.05$ )
- in group IV – highly statistically significant differences between  $T_0$ - $T_{14}$ ,  $T_0$ - $T_{30}$  and  $T_{14}$ - $T_{30}$  ( $p < 0.001$ ).

*b) Comparative statistical analysis for emotional and locomotor behavior (Table II)*

The statistical analysis of open field test values – emotional score, considering the groups of rats II, III and IV, showed no statistically significant differences between the groups at time  $T_{14}$  or at time  $T_{30}$  ( $p > 0.05$ ).

The statistical analysis of open field test values – locomotor score, considering the groups of rats II, III and IV, showed highly statistically significant differences between at least two of the groups both at time  $T_{14}$  and at time  $T_{30}$  ( $p < 0.0001$ ).

The statistical analysis of open field test values for unpaired samples evidenced the following for:

- emotional score
  - o at time  $T_{14}$  – highly statistically significant differences between groups I-II, I-III and I-IV ( $p < 0.001$ )
  - o at time  $T_{30}$  – statistically significant differences between groups I-II, I-III and III-IV ( $p < 0.05$ )
- locomotor score
  - o at time  $T_{14}$  – highly statistically significant differences between groups I-II, I-III, II-IV and III-IV ( $p < 0.001$ )
  - o at time  $T_{30}$  – highly statistically significant differences between groups I-II, II-III, II-IV and III-IV ( $p < 0.001$ ) and very statistically significant differences between groups I-III ( $p < 0.01$ ).

The statistical analysis of open field test values for paired samples ( $T_{14}$ - $T_{30}$ ) evidenced the following for:

- emotional score – statistically significant differences for group II ( $p < 0.05$ ) and very statistically significant differences for group IV ( $p < 0.01$ )
- locomotor score – highly statistically significant differences for group II ( $p < 0.001$ ), statistically significant differences for group III ( $p < 0.05$ ) and very statistically significant differences for group IV ( $p < 0.01$ ).

## Discussions

### *Experimental depression model*

Authors have studied depression in genetically selected animals and in models with depression induced surgically, pharmacologically and by acute and chronic stress procedures (Bruja, 2014; Puiu, 2014; Duman, 2010; Henn & Vollmayer, 2005; Willner, 1990).

Reserpine has been used as a depression-inducing pharmacological agent. Reserpine is the main alkaloid extracted from the root of the *Rauwolfia serpentina* plant, originating from India, Indonesia, Ceylon, Malaysia, Central Africa, Central and South America. It has a predominantly central tranquilizing, antidepressant action, as well as a peripheral action, by deregulating

the metabolism of endogenous biogenic monoamines: noradrenaline, dopamine and serotonin. The tranquilizing effect occurs within 40-60 minutes of administration. Long-term administration has cumulative antipsychotic effects.

The use of reserpine in the form of various preparations (Raunervil<sup>+</sup>, Rausedyl<sup>R</sup>, Reserpin<sup>R</sup>, Serpasil<sup>R</sup>) for the treatment of essential hypertension is limited by the intense depressive state that it can induce. It is recommended only in psychoses accompanied by hypertension. This observation underlies the use of reserpine for experimental purposes, to induce depression (\*\*\*, 2018).

Our results obtained in group G II, with reserpine administration, show the development of depressive behavior at time  $T_0$  compared to controls (G I) on the TST test, and its significant increase at 14 days after administration ( $T_{14}$ ) and at 30 days ( $T_{30}$ ), compared to controls.

Emotional behavior evaluated by OFT increases significantly at 14 days compared to initial values. Locomotor behavior in the same test decreases significantly at 14 days and at 30 days compared to initial values.

Our results show that the pharmacological experimental model of reserpine-induced depression in G II is a valid model, in accordance with the findings of authors who used this model (Arora & Chopra, 2013; Ruiz et al., 2018). Depression induced in sedentary animals rapidly develops and lasts for a long time.

### *Administration of paliperidone, an atypical antipsychotic in experimental depression*

Paliperidone is the active metabolite of risperidone, an atypical neuroleptic, which has a high affinity for  $D_2$  and  $5HT_2$  receptors that it inhibits. The preparation is indicated in schizophrenia, bipolar disorders and as a sleep inducer.

In group G III, with reserpine-induced depression and paliperidone treatment, the following were found:

- a significant increase in depression at  $T_{14}$  and  $T_{30}$  compared to G I and compared to initial values
- a significant increase in emotional behavior at  $T_{14}$  and  $T_{30}$  compared to initial values
- a significant decrease in locomotor behavior at  $T_{14}$  and  $T_{30}$  compared to initial values.

Co-treatment with reserpine and paliperidone in sedentary animals (G III) induces a significant decrease in depressive behavior at  $T_{30}$  compared to initial values and compared to  $T_{14}$ .

### *Paliperidone administration and exercise in experimental depression*

The research performed on G IV shows:

- a significant increase in depressive behavior at  $T_{14}$  and  $T_{30}$  compared to G I and compared to initial values
- a significant increase in emotional behavior at  $T_{14}$  compared to initial values
- insignificant changes in locomotor behavior at  $T_{14}$  and  $T_{30}$  compared to initial values.

The antidepressant role of physical exercise has been demonstrated in various studies on human subjects (Matthews et al., 2011; Weber & Edwards, 2010; O'Connor, 2007; Krogh et al., 2009; McKercher et al., 2009; Blumenthal et al., 2007; Conn, 2010) and on animals with induced depression (He et al., 2012; Marais

et al., 2009; Sigwalt et al., 2011; Hendriksen et al., 2012; Dimatelis 2012; Russo-Neustadt et al., 2000; Dey et al., 1992; Soares et al., 2003).

The antidepressant mechanisms of exercise can be due to:

- an influence on the metabolism of serotonin and its precursors in the brain (He et al., 2012; Dey et al., 1992; Soares et al., 2003; Moon et al., 2012)
- an influence on the oxidant/antioxidant balance in the brain (Bruja, 2014) and to the protective antioxidant role of exercise (Arent et al., 2012)
- activation of neurotrophic factors in the hippocampus (Marais et al., 2009; Garza et al., 2004)
- changes in the functional level of proteins in the hippocampus under stress conditions (Yang et al., 2012; Dimatelis, 2012).

Compared to G III of sedentary animals, the results obtained for animals with depression, treated with paliperidone and exercise trained (G IV) show the following at 30 days:

- a significant increase in depressive behavior
- a significant decrease in emotional behavior
- a significant increase in locomotor behavior.

The results obtained in groups II, III and IV, compared to the control group (G I), evidence:

- a significant increase in depressive behavior at 14 and 30 days compared to initial values, with the greatest increases in G IV and compared to initial values
- a significant increase in emotional behavior at 14 days in groups II, III, IV and at 30 days in G III
- a significant decrease in locomotor activity at 14 days in groups II, III and at 30 days in G III.

Depending on the time of examination, the following were found for groups II, III and IV compared to initial values:

- the greatest significant increase in depression at 30 days in G II and at 14 days in groups III and IV
- a significant increase in depression in all groups at 14 days and at 30 days
- a significant increase in emotional behavior in groups II, III, IV at 14 days and in G III at 30 days
- a decrease in locomotor activity in all groups, with significant values at  $T_{14}$  and  $T_{30}$  in G II and G III, and a tendency to return to initial values in G IV.

Co-treatment with reserpine and paliperidone in exercise trained animals determined significantly decreased values of depressive behavior at  $T_{30}$  compared to sedentary animals, which supports the antidepressant role of exercise under these conditions.

## Conclusions

1. The pharmacological experimental model of reserpine-induced depression is a valid model, the animals being characterized by an increase in emotional behavior and a decrease in locomotor activity.

2. Treatment with paliperidone – an atypical antipsychotic – in sedentary animals with reserpine-induced depression determines an increase in emotional behavior and a decrease in locomotor activity.

3. Treatment with paliperidone in exercise trained animals with experimental depression determines moderate

increases in emotional behavior and the maintenance of locomotor activity within normal limits.

4. Exercise has favorable effects on locomotor activity in depressed animals treated with an atypical antipsychotic.

## Conflicts of interest

There are no conflicts of interest.

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## Quantitative measurement of adaptation to chronic patient status after total hip arthroplasty: adaptive coping scales

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### Abstract

**Background.** Cognitions/cognitive processes help people to adjust their emotions after experiencing a negative experience: in the case of this paper, the condition of an endoprotected patient.

**Aims.** In the paradigm of health psychology, the evaluation and quantification of emotional, cognitive and neuropsychological disorders have clear recommendations on post-therapy programs and quality of life after discharge.

**Methods.** The study was performed on 40 total hip endoprosthesis patients divided into two distinct groups: 20 patients admitted for total hip arthroplasty and 20 endoprotected patients over a period of more than one year. Both groups were given the SACS adaptive coping scale questionnaires.

**Results.** Calculations were made to compare the differences between the two means: the mean obtained for group 1 and group 2 against the mean of the standards of these tests. The results obtained show a statistically significant difference: at the threshold  $p < 0.001$  on the assertive action variable, the very significant difference in antisocial action, and aggressive action, significant differences for social support search, and very significant differences for indirect action, avoidance.

**Conclusions.** Regardless of the time of the maladaptive response patterns of patients with hip prosthesis, there is a reaction of depression, anxiety and decreased self-esteem, and in patients with more than one year after intervention, adaptive emotional mechanisms result, arising from a positive evaluation of the event's positive analysis in the adaptation reaction to the chronic patient condition.

**Keywords:** total hip arthroplasty, behavioral coping strategy, cognitive-emotional adaptation.

### Introduction

Recent research on quality of life aspects after arthroplasty of the hip demonstrates and claims that any approach should be made from the perspective of integrated medicine, pathology, and insists that emphasis should be placed on a complete map of medical and psychological factors, through standardized models of multifactorial therapies. In the paradigm Psychology, Health Behavior, persons experiencing stressful situations respond to these situations by adopting functional or dysfunctional coping strategies (Zhang et al., 2012). Life expectancy growth is the main factor in this equation, and the increase in the number of arthroplasties in the young population leads to the need to analyze quality of life beyond the immediate post-surgery period.

According to Khan et al., 2011, acute post-surgery pain becomes chronic, being the main cause of slow recovery and biological and functional distress. Recovering functionality can also be achieved by analyzing medical,

demographic and psychological factors. Considering that at least 15% of hip prostheses do not show an improvement in health status (Joshi et al., 2002), primary care combined with tertiary prevention would provide a better interpretation of results based on a comprehensive and integrated rehabilitation plan before and after surgery.

Symptomatic treatment is insufficient if it is not paralleled by the treatment of emotional dysfunctions, avoidance strategies, abandonment, antisocial action up to aggressive action. Negative emotions interfere with recovery, being a factor of negative impact, and may even entail the need for psychiatric treatment. Here, rehabilitation psychology plays an important role (Ziden et al., 2010).

We used specific empirical tools that reflected the neuropsychological changes, and thereby we increased the importance of the doctor-patient collaboration in the biomedical and psycho-social paradigm. The need to perform these studies was outlined in the aftermath of the finding that in fact:

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- we do not fully assess patients before inclusion;
- we do not apply an efficient management before surgery;
- we do not properly monitor patients after discharge from the perspective of the bio-social paradigm;
- we do not have efficient control and methodological factors, which may compromise the functional and psychological response of the patient.

Control and assessment of stress is required in a personal and customized manner. The reason is simple and starts from the premise that facing the same stress factor, two people act in distinct ways (Garnefski et al., 2001). Cognitive-emotional regulation, or cognitive coping, can be understood as a cognitive manner of managing emotionally aware information.

Cognitive processes or cognitions can help us manage or regulate emotions or feelings, and keep control of our emotions, in order not to get overwhelmed. We react as “emotional managers” and the main function of emotional regulation is to reduce negative stress (Lazarus & Folkman, 1984). Cognitive-emotional regulation strategies are considered to be more effective than problem-based coping because, if nothing can be changed, problem-based strategy may fail or become counterproductive. In such situations, coping with the problem can be a better strategy (Folkman & Moskowitz, 2004).

Strategic Approach to Coping Scale (SACS) is a self-assessment questionnaire, which measures active, passive, prosocial, antisocial, direct, indirect behavioral strategies of adults over 18 years of age. Specifically, using this questionnaire, it is possible to assess how behavioral people generally react when faced with a stressful situation. The evaluated strategies rather refer to the general tendency to address problems by resorting to a specific set of behaviors (Lester et al., 1994). This trend is quite stable over time. It is known, however, from the specialized literature on coping that in certain situations, people use specific coping strategies that can be distinguished from the strategies they would use in other situations or the strategies they would generally use. People’s ability to systematically use different coping strategies in different situations describes the flexible nature of coping and has adaptive value (Hobfoll et al., 2007).

## Objectives

The present study uses quantitative methods and analyses, and the objectives are the analysis of coping mechanisms developed by patients with total hip arthroplasty (THA), identification of the level of adaptation to the chronic condition of patients with THA, using the evaluation of variables and predictors of social support, psychological distress perceived by patients with THA.

## Hypothesis

The cognitive emotion regulation strategies accounted for considerable amounts of variance in emotional problems and strong relationships were found between the cognitive strategies and symptoms of depression and anxiety, both at the first measurement and at follow-up.

The aim of this study is to demonstrate the significant differences in the perception of social support, indirect action and avoidance according to the adaptive coping

strategy developed by patients with THA.

## Material and methods

### *Research protocol*

The study was approved by the Research Ethics Committee of UMF Cluj-Napoca. Also, all the patients who participated in the study gave their consent to the use and publication of the results obtained during their assessment for research purposes.

### *a) Period and place of the research*

The study was conducted on patients admitted to the Department of Balneology of the Rehabilitation Clinic Cluj-Napoca, who presented a recent history or an interval of more than one year after hip prosthesis, in the period October 2016 - March 2017.

### *b) Subjects and groups*

The study was conducted on a number of 40 subjects. The patients were divided into two groups consisting of 20 patients each. The first group, identified as “the reference group”, consisted of 9 female patients and 11 male patients admitted for THA. The second group, identified as “the study group”, consisted of 9 female patients and 11 male patients, with more than one year after THA. In both cases, the predominant age range of the studied population was 60-70 years. The exclusion criteria were set as follows: the presence of a recent history or an interval of more than one year after hip prosthesis and the absence of psychiatric problems prior to surgery.

### *c) Tests applied*

#### Strategic Coping Approach Scale (SACS)

Description of items: The questionnaire contains 52 items that relate to how a person reacts, generally what a person does when faced with a stressful situation or problem. The items are divided into nine subscales, so each SACS subset contains between 4 and 9 items.

Below are the subscale names with the corresponding items. The numbers correspond to the number the item has in the actual questionnaire:

1. Assertive action
2. Social networking
3. Search for social support
4. Prudent action
5. Instinctive action
6. Avoidance
7. Indirect action
8. Antisocial action
9. Aggressive action

The questionnaire can be administered both individually and by groups, in pencil and paper version and in computerized version. The place where the questionnaire is to be completed must provide good conditions so that the persons tested can concentrate without disturbing noises, with sufficient light and, if administered to a group, the distribution should be such that there is enough space to complete everything in peace and privacy. As a rule, completing SACS lasts 7 minutes.

Using SACS for scientific purposes: Before setting up a prevention, personal development or intervention plan, it is important to know what type of coping a person is using, how often he/she uses certain strategies for as long as possible. The coping strategies are not adaptive or

disadaptive “*in abstractio*”. Their functionality depends on the characteristics of the stressor, the context in which it occurs, the frequency and duration of use. The dependent variables were the SACS quality of life measurement scales, and the independent variable was the hip prosthesis patient condition, constituting two groups of subjects 1 and 2.

#### d) Statistical processing

The statistical analysis used in these studies was complex because we used statistical testing tools as varied and as accurate as possible, with a higher testing power to minimize the occurrence of statistical errors.

Descriptive and interference statistics were used:

- MedCalc Statistical Software version 18.10 (\*\*\*, 2018). The data were described by mean and standard deviation. The ANOVA test was used for repeated measurements analyzing the dispersion of the dependent variable. A value of  $p < 0.001$  was considered statistically significant;

- the linear trend, the representation of the prognosis in the context of the phenomenon analyzed;

- ANOVA Multiple Comparison Test, Fisher's exact test, Pearson correlations from Statsoft Statistica 10, with which we developed histograms showing how the scores were divided into questions, the percentage of identical responses in different variables, a significant difference between variables at  $p < 0.05$  and a very significant difference at  $p < 0.001$ .

Regression analysis involved several steps: individual and isolated testing of the effect of the predictor on the criterion variables was performed initially and then, the complete and summarized statistical analysis.

For the comparative exploratory analysis we used the results and scores obtained after applying the SACS questionnaires for which we had statistical distances.

## Results

The study was conducted on a number of 40 patients: 55% were men and 45% were women (Fig. 1), with a mean age of 56.9 years (Fig. 2).

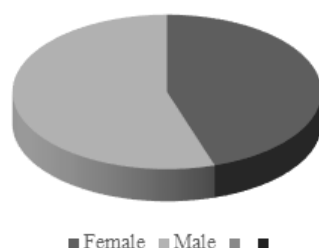


Fig. 1 – Gender demographic representation of the groups.

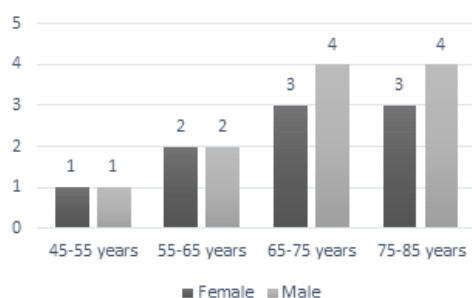


Fig. 2 – Demographic representation by age.

The results are presented in the histograms from Fig. 3 to Fig. 6.

For a detailed and comparative description, we used the technique of histograms, to which all the variables and independent predictors used in the SACS scale were overlapped for prognosis. The histogram represents that diagram based on rectangles which are class ranges and areas proportional to the number of observations related to the class intervals. Therefore, we note that the ratio between the length of the interval and the number of observations is the height of the rectangle. The density scale is the vertical axis. The Gaussian bell or the probability density of the normal distribution is given by the extreme point convention.

We followed the comparative exploratory analysis between the dependent and independent variables of the results and the scores obtained by applying the scales, with statistical distances available. Data filtering was done using the LSD Fisher Multiple Correlation Test, and Pearson correlations that revealed significant differences for prudent action and instinctive action, and very significant differences for avoidance, social support search, indirect action.

Interpretation: Indirect action by which we manipulate the situation to make others believe that they have control, while solving the problem in a non-transparent manner, “behind the scenes” (the direct-indirect dimension).

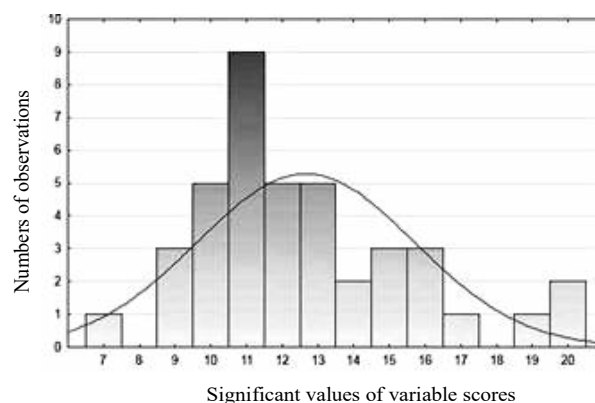


Fig. 3 – Indirect action coefficient as a cognitive-behavioral dependent variable, group 1 and group 2

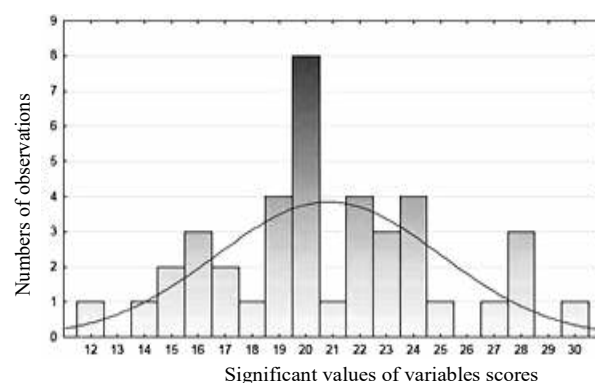
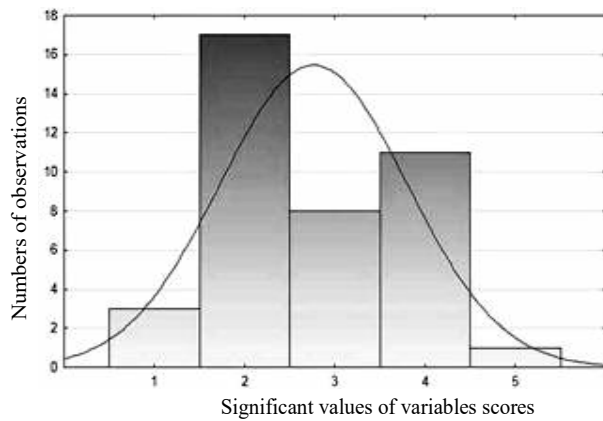


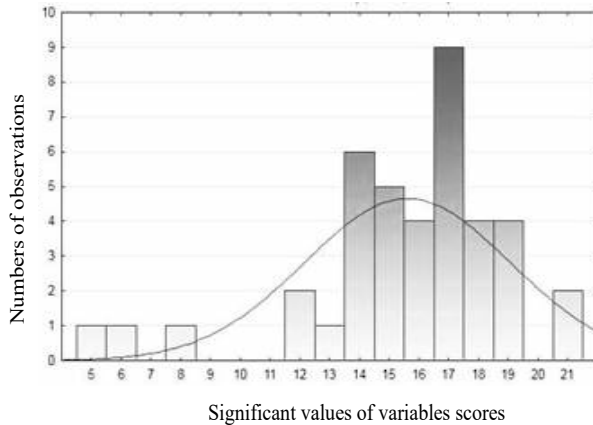
Fig. 4 – Social support coefficient as a cognitive-behavioral dependent variable, group 1 and group 2

Interpretation: Searching for social support, through which we appeal to others for emotional help and support, and through which we consult with family and friends about what we have to do (the prosocial - antisocial dimension).



**Fig. 5** – Avoidance coefficient as a cognitive-behavioral dependent variable, group 1 and group 2

Interpretation: Avoidance, by which we engage in other activities so that we no longer have to deal with the problem, withdraw or wait for it to solve by itself.



**Fig. 6** – Social networking coefficient as a cognitive-behavioral dependent variable, group 1 and group 2

Interpretation: Social networking, by which we engage in relationships with social groups, in order to establish interpersonal connections.

An analysis of the above histograms shows how dysfunctional psycho-behavioral attitudes generate cognitive-emotional responses through avoidance, antisocial actions, aggressive actions in groups 1 and

2 versus general average standards, as well as increased levels of indirect action reactions, prudent action, search for social support, assertive action for group 2. By correlating all the obtained results, we formulate the idea that the deterioration of the quality of life predictors is a potential vulnerability factor of patients with hip prosthesis. Even in the absence of major differences in Avoidance, Indirect Action, Antisocial Action, Aggressive Action among the subjects of the groups, there is a decrease in them over time. However, we note that for Assertive Action, Social Networking, Social Support, Prudent Action, Instinctive Action, the increasing tendency is evident in group 2.

Calculations were performed to compare the differences between the two means: the mean obtained for groups 1 and 2 and the mean of the standards of these tests (Table I).

The results obtained indicate:

- a very statistically significant difference at the  $p < 0.001$  threshold for the assertive action variable
- a very significant difference for antisocial action ( $p = 0.000025$ ), and aggressive action ( $p = 0.000001$ )
- significant differences for social support search ( $p = 0.000434$ )
- very significant differences for indirect action ( $p = 0.00000032$ ), as well as avoidance ( $p = 0.00000020$ ).

This demonstrates that regardless of the time of operator maladaptive response patterns of patients with hip prosthesis, there is a reaction of depression, anxiety and decreased self-esteem, and in patients with more than one year after intervention, adaptive emotional mechanisms occur, resulting from a positive evaluation of the event's positive analysis in the attempt to adapt to the condition of a chronic patient.

- Adopting a behavioral coping strategy which involves assertiveness correlates with positive control beliefs about the illness ( $p = 0.011$ ,  $F = 2.19$ ), as well as with a sense of illness coherence ( $p = 0.02$ ,  $F = 1.19$ ).

- Adopting a cautious behavior is a prosocial behavioral coping strategy which correlates with a positive emotional perception of the chronic status ( $p = 0.0004$ ,  $F = 3.10$ ).

- Adopting an aggressive behavior correlates weakly with control beliefs about the illness ( $p = 0.000001$ ,  $F = 4.94$ ). This result could be explained by the fact that the chronic status of those patients is perceived by patients as particularly harsh, both physically and emotionally; therefore a direct and individualistic approach when it comes to fighting the illness could be useful.

**Table I**  
Descriptive table of variables dependent on the ANOVA test

Variable	SS	df	MS	SS	df	MS	F	p
Assertive action	62.64	19.00	3.30	90.25	60.00	1.50	2.19	0.011179
Social networking	29.20	19.00	1.54	112.00	60.00	1.87	0.82	0.671806
Prudent action	44.94	19.00	2.37	71.25	60.00	1.19	1.99	0.022663
Search for social support	82.05	19.00	4.32	83.50	60.00	1.39	3.10	0.000434
Indirect action	94.20	19.00	4.96	77.00	60.00	1.28	3.86	0.000032
Avoidance	93.25	19.00	4.91	73.50	60.00	1.23	4.01	0.000020
Instinctive action	40.44	19.00	2.13	115.75	60.00	1.93	1.10	0.371147
Antisocial action	100.74	19.00	5.30	80.75	60.00	1.35	3.94	0.000025
Aggressive action	93.80	19.00	4.94	60.00	60.00	1.00	4.94	0.000001

**Table II**  
 Prosocial-antisocial predictors/percentile analysis Percentile Weighted Average.

Analysis of variable predictors		Percentiles						
Predictors	Groups	5	10	25	50	75	90	95
Assertive action	1	-6.95	-5.70	-.75	3.50	4.75	5.90	7.90
	2	-1.80	2.10	4.25	6.00	7.75	9.80	10.95
Social networking	1	5.05	6.20	13.25	14.50	16.00	17.90	18.95
	2	12.10	14.10	16.25	17.00	18.75	20.80	21.00
Searching for social support	1	12.10	14.10	16.00	18.50	20.00	20.00	22.85
	2	19.05	20.00	22.00	23.50	26.50	28.00	29.90
Prudent action	1	9.05	10.10	12.00	14.00	16.75	17.00	17.95
	2	12.10	14.10	15.25	17.00	19.00	22.00	22.95
Instructive action	1	8.10	10.00	14.00	16.00	18.00	18.00	18.95
	2	16.00	16.00	17.00	20.50	23.75	26.80	29.85

**Table III**  
 Analysis of coping strategies.

Analysis of coping strategies		Percentiles						
Predictors	Groups	5	10	25	50	75	90	95
Avoidance	1	2.00	2.00	2.00	2.50	4.00	4.00	4.95
	2	1.00	1.00	2.00	2.50	3.75	4.00	4.00
Indirect action	1	7.10	9.00	10.00	11.00	12.00	13.00	15.85
	2	11.00	11.00	12.00	14.00	16.00	19.90	20.00
Antisocial action	1	17.05	18.40	23.25	26.50	30.00	31.00	32.90
	2	28.10	30.00	31.25	35.50	38.00	43.00	48.70
Aggressive action	1	9.05	10.10	14.00	15.00	16.00	17.00	19.85
	2	12.15	15.10	16.25	17.50	19.00	21.90	24.85
TOTAL	1	41.15	44.30	51.50	57.00	58.75	60.00	60.00
	2	60.00	60.30	64.00	68.50	77.75	86.50	93.65

The 95<sup>th</sup> percentile means that 95% of the subjects will have a score up to that value and the remaining 5% above that value. E.g. Table 1 Group 1 Assertive Action Percentile 95 Value 7.90 (95% of subjects will have a score of 7.90 or lower for Assertive Action and 5% will have a score above 7.90 for Assertive Action).

By comparing the percentiles between the two groups according to Table II, it can be seen that the highest differences are found for subjects of group 2 compared to those at the time of surgery in the case of:

- Demand for social support (7.15 percentile difference).
- Prudent action (5 percentile difference).
- Instructive action (10.9 percentile difference), which means that social adaptation and reintegration have increased values in group 2.

Following analysis of coping strategies, Table III shows the differences in the case of patients who are more than one year post-surgery.

- Indirect action (4.15 percentile difference);
- Antisocial action (5.80 percentile difference);
- Aggressive action (5 percentile difference).

## Discussions

Studying the psychological response to the patient's condition requires its study in qualitative quantification and, consequently, an estimate of the quality of post-

surgical life (Ziden et al., 2010). Improving adaptation to disease results from knowing the mechanisms of adaptation to the new condition of life.

An important aspect of psychological and psychodiagnostic assessment is the identification of risk and protection factors associated with the development and maintenance of emotional and behavioral problems. These results in conjunction with those of other literature studies suggest that indeed, coping strategies can be identified which are more frequently associated with both psychopathological conditions and low emotional distress (Aldao et al., 2010). Other studies have shown that active and prosocial coping strategies have tended to be more often associated with positive emotional consequences, with low levels of anxiety and depression, while antisocial coping has been associated with increased levels of anger, and avoidance with increased anxiety and depression (Balgiu, 2016).

Coping is a "cognitive and behavioral effort to reduce, master, or tolerate internal or external demands that exceed personal resources" (Hertel & El-Messidi, 2006). Analyzing the definition in question, we can highlight an essential feature: coping is an illustration of the fact that stress only manifests itself in the relation between the subject and the situation, being inconceivable outside the "action-cognition-disadaptive behavior" triad (Martin & Dahlen, 2005).

Although the described patterns can explain some of the difficulties a number of patients encounter both in relation to their own illness and in their relationship with the doctor, the problem of those patients who do not fall into these categories and who, without having a serious, potentially irreversible psychic impairment, are confined to coping-defective mechanisms remains open. In these cases, it is important to draw attention to the issue of educating the patient towards adapting to a new lifestyle and acquiring effective strategies to adapt to stressful situations.

In order to achieve this goal, following the identification of disadaptive mechanisms, one can use a form of psychotherapy appropriate to the needs and possibilities of the patient (Mazure, 1998). Also, to benefit from social relationships or the protection of family/friends, individuals can intensify their emotions as a regulation mechanism (Tuno & Bozo, 2012), while emotional suppression decreases effective cognitive performance, due to the fact that this type of mechanism implies a decrease in the ability to search for solutions, decisions, and follow-up actions.

Favreul et al., 2008 substantiate the criteria for a correct assessment scale, sensitivity, specificity, validity and reliability assessed with a numerical basis. Subjectively, the biomechanical, psychomedical and psychosocial response is the ability of perception, cognition, and behavioral response of the chronic patient with hip prosthesis; in this sense, the assessment must resort to multidimensional social and psychological models (Reisberg & Hertel, 2004).

Knowing the cognitive-behavioral coping strategies that correlate with a functional perception of illness enables the development of personalized psycho-educational programs for patients with a surgery history, in order to increase compliance with treatment, improve rehabilitation programs and quality of life (Rissanen et al., 2000).

#### Study limitations

The following limitations should be considered when interpreting the results of this study. First, this is a transversal study, whereas a longitudinal one would be more appropriate for analyzing the perception of chronic status patients. Secondly: the small number of patients. A higher number of patients could provide a more significant statistical analysis. The third limitation could be due to the self-administration of tests. Some answers could be motivated by social, cultural, and environmental representations of illness. The forth limitation is related to the absence of scientific studies in Romania using the mentioned methodology, which provides no terms of comparison for the results and brings novelty from the perspective of psychological research to the field of rehabilitation.

#### Conclusions

1. The results show that assessment, intervention and psychological counseling are indicated in the context of an impairment of quality of life indices for patients with hip prosthesis. As a corollary of the study, based on the results obtained for Avoidance, Aggressive Action, Antisocial Action, as a component of vulnerability, a more multidisciplinary model can be created in the interaction between the medical team, the family, the patient.

2. Perspectives of the study: analysis and creation of a cognitive-behavioral treatment model aimed at: rational analysis, coping skills (Progressive Relaxation and Autogenic Training, Planning Pleasant Activities, Attraction Exercises, Positive Imaging, Counting Methods etc., Cognitive Restructuring through Functional Cognitions).

3. Evaluation of quality of life indicators to prevent THA complications is the necessary and sufficient tool which, through the multitude of standardized scales, leads to a fair assessment of the individualization of pre- and post-surgery treatment.

4. A patient who receives medical and psychologically integrated support is likely to avoid complications after THA. The social and professional reintegration of this patient depends on adaptive coping mechanisms developed before and after surgery, and this goal can be achieved through a good clinician-patient-psychologist collaboration.

5. The horizon of expectation must be well set and attained by the entire team mentioned above; this can only be achieved by setting realistic and pertinent objectives in the particular context of each patient, with well-defined working tools and analysis.

#### Conflicts of interest

There were no conflicts of interest during the research period.

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## CASE STUDIES

### A clinical case of camptocormia in an 85-year-old patient

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#### Abstract

**Background.** Camptocormia (CC), also known as “bent spine syndrome”, is still an unfamiliar affliction to many practitioners. Although it has no definitive treatment, when diagnosed in time, its signs and symptoms can be significantly alleviated by physical therapy.

**Aim.** The aim of this paper is to present a clinical case along with recent literature data, in the hope of raising awareness of this condition that has serious implications on patient quality of life.

**Case.** In the current paper, we present the case of an 85-year-old female patient who was admitted to the hospital for chronic lumbar pain and an inability to maintain vertical posture while walking, symptoms that had emerged more than ten years before, but worsened in the last year. After ruling out alternate disorders, the patient was diagnosed with idiopathic camptocormia. During her two-week stay in the Rehabilitation Department, the patient benefited from physical and pharmacological therapy, with minimal alleviation of her symptoms probably due to the long-term evolution of the disease.

**Conclusions.** Camptocormia is a serious disorder that usually has a long evolution (years) and severely affects the patient's independence and quality of life. When diagnosed in time, specific rehabilitation treatment can be administered, with significantly better results than those achieved after chronic muscle alterations are established, like in the case of our patient.

**Keywords:** camptocormia, “bent spine syndrome”, chronic lumbar pain, physical therapy

#### Introduction

Camptocormia is a postural disorder defined as an unintentional flexion of the thoracic and lumbar spine when the patient is standing upright and walking, while in supine position the column regains its physiological configuration (Finsterer & Strobl, 2010; Margraf et al., 2016). In a few cases, camptocormia can exist as a self-standing condition, but more often it is the result of a primary condition such as Parkinson's disease (most frequently), myopathies, dystonia, spinal stenosis, psychiatric conditions, hypothyroidism, and it can even be induced by certain drugs (Bloch et al., 2006; Finsterer & Strobl, 2011). A recent paper published by Fasano et al. (2018) set the diagnostic criteria for camptocormia associated with Parkinson's disease: in lower camptocormia, defined as L1-sacrum, a bending angle of more than 30 degrees is considered diagnostic, while for upper camptocormia, defined as C7-T12-L1, 45 degrees are considered diagnostic (Margraf, 2018; Fasano et al., 2018).

The “bent spine syndrome” usually affects older patients (Pellieux, 2000) and is accompanied by chronic lumbar pain and paraspinal muscle hardening (Margraf

et al., 2016). Camptocormia is thought to be caused by a progressive weakening of the back extensor muscles, which can be objectified on MRI sequences as fatty degeneration and atrophy (Abe et al., 2010). Before any diagnosis of camptocormia can be set, fixed kyphosis such as spinal fractures caused by trauma or osteoporosis, bone cancer and metastasis, bone tissue infections and ankylosing spondylitis should be excluded.

There is no specific treatment that can cure this particular disorder. In camptocormia caused by drug administration, the signs and symptoms usually fade away after cessation or dose reduction of the incriminated medication (Finsterer & Strobl, 2010; Gonzalez-Pablos et al., 2016). Paradoxically, although L-Dopa is also known to cause camptocormia (Margraf et al., 2016), there are some cases of CC associated with dystonia or Parkinson's disease in which initiation of L-Dopa therapy alleviates the clinical signs and symptoms of CC (Van Gerpen, 2006; Finsterer & Strobl, 2010; Margraf et al., 2016). Deep brain stimulation could be useful in certain cases of CC related to Parkinson's disease or dystonia (Capelle et al., 2011), and spine surgery such as posterior thoracolumbar fixation (Peek et al., 2009) can also

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be performed, yet the decision to operate should be seriously weighted since the risks may overrun the benefits.

Recent studies have emphasized the importance of physiotherapy for the management of camptocormia. A sustained program of exercises consisting of muscle stretching and strengthening, backpack wearing and balance exercises has proved to significantly improve the bending angle, lumbar pain, balance and also the quality of life (Lee et al., 2017; Gandolfi, 2019). Furthermore, injection of botulinum toxin in rectus abdominis muscles may be beneficial in camptocormia related to Parkinson's disease and focal dystonia (Todo et al., 2018).

## Hypothesis

We present the case of an 85-year-old woman diagnosed with idiopathic camptocormia in our clinic, in order to make this rare affliction known and to give an example of a rehabilitation approach in this type of disease.

## Material and methods

The study was carried out according to the current deontological laws, after the patient gave her written informed consent.

### Research protocol

#### a) Period and place of the study

In March 2019, the patient was admitted to the Rehabilitation Department of Elias University Hospital Bucharest.

#### b) Subject

An 85-year-old woman was admitted to the Rehabilitation Department for chronic lumbar pain with mixed features, both inflammatory and mechanical, atypically radiating to the right inguinal area, static spinal deformities, along with an inability to maintain vertical position while walking and bilateral paresthesia "in toe and sole". Pertaining to medical history, the patient was known with arterial hypertension, undocumented atrial fibrillation and NYHA III cardiac failure. It is important to mention that the patient was not using olanzapine, donepezil, valproate, steroids and L-Dopa, some of the drugs that are known to cause camptocormia (Vela et al., 2006; Cannas et al., 2009; Finsterer & Strobl, 2010).

#### c) Tests applied

No notable signs were found at the *general examination*.

The *local exam of the vertebral column* evidenced a tendency to straightness in the dorsolumbar region, lumbar scoliosis, mobility limitation in all axes due to pain, a Schober index of 2 cm, bilateral paraspinal muscle hardening, more important on the right side, and pain on palpation of the T4-T10 spiny apophysis. Regarding neurovascular syndrome, right shin hypotrophy was found, as well as brisk symmetrical osteotendinous reflexes, excepting Achilles reflexes that were abolished. The Babinski sign was present bilaterally, the Lasegue test was negative on both sides, and even if no objective sensitivity alterations were detected, the patient reported bilateral paresthesia "in toe and sole". No clinical signs of Parkinson's disease were observed.

*Functional assessment* revealed the bending of the trunk when standing and walking, which appeared to be caused by the involuntary antelexion of the lumbar spine. As a result, the point of balance shifted forward and the patient developed irreducible right hip flexum and bilateral knee

flexum. The consequences of these alterations manifested themselves in walking, making it insecure, with small steps and dragging of the feet. Furthermore, in order to maintain her balance, the patient projected her upper limbs backwards while standing and walking ("back-swept wing sign") (Margraf et al., 2016). It should be mentioned that we did not measure the bending angle of the spine, because at the time of the examination it was generally believed that it is not a diagnostic criterion for the presence of camptocormia, although if measured it is recommended that the patient should keep the upright position for at least five minutes prior to it (Margraf et al., 2016).

We ruled out myopathies and hypothyroidism, some of the mentioned causes that can lead to camptocormia (Finsterer & Strobl, 2010; Margraf et al., 2016) by *blood analysis*. *Electromyography* was not available to use for differential diagnosis between neurogenic, myopathic and myositic changes. *Vertebral spine radiographic* changes are not specific for this disorder. In our case, X-ray uncovered dextroconvex lumbar scoliosis at L2 level, L3 anterolisthesis, anterolateral thoracolumbar osteophytosis, and reduced L4-L5 and L5-S1 intervertebral spaces (Fig. 1). The anterolisthesis measured 9.5 mm in neutral sagittal position and 6 mm in vertebral spine flexion (Fig. 2). The patient was not able to stand in extended vertebral column position.



Fig. 1 – Vertebral spine X-ray: A - anteroposterior view; B - lateral view.



Fig. 2 – X-Ray: flexion of the vertebral spine, lateral view.

*Thoracolumbar spine MRI* was performed in order to observe the extent of muscle damage our patient had. It is mentioned in the literature that depending on the duration of the disorder, MRI could reveal edema and swelling of paravertebral muscles in acute forms (<31 months), using preferably STIR sequence, and/or asymmetrical atrophy and fatty degeneration in chronic disease (>37 months), using preferably T1-sequence (Bonneville et al., 2008; Margraf et al., 2016). In our patient, MRI did indeed show fatty degeneration of the paravertebral muscles, more pronounced than would be found in a patient of the same age (Fig. 3).



**Fig. 3** – MRI of the lumbar spine in T2-sequence. Asymmetrical fatty degeneration of the paravertebral muscles in an 85-year-old patient

During her two weeks stay, besides the pharmacological treatment for her cardiac pathology, the patient followed a five days a week program of physical therapy that consisted of kinetotherapy focused on paravertebral muscle strengthening, walking exercises and balance improvement, and locally applied physical agents for the chronic lumbar pain. We also recommended the patient to wear a thoracolumbar orthosis but it was poorly tolerated. Only minor improvements in the patient's posture were observed, but the back pain diminished.

## Discussion

The patient seemed to suffer from idiopathic camptocormia since she did not present any sign of Parkinson's disease or dystonia, did not use any of the known drugs that can lead to camptocormia, and hypothyroidism was excluded by blood analysis. Furthermore, she did not have any criteria for ankylosing spondylitis, did not have a positive history of tuberculosis, and lumbar X-ray and MRI did not reveal any vertebral fracture, spinal stenosis or other causes of fixed kyphosis. However, we were not able to perform electromyography or muscle biopsy to rule out various myopathies and myositis.

Camptocormia is a very rare disorder and/or syndrome and as a result, a long time passes between its onset and

the establishment of correct diagnosis. This gives time for the chronic alterations of the paravertebral muscles to set in, making it difficult, if not impossible, for physiotherapy programs to achieve significant results. Furthermore, there are no rehabilitation protocols for the management of this disorder and we cannot be sure that our approach was the most efficient one. Extensive studies should be conducted in order to establish a rehabilitation protocol that would help these patients.

Another reason why our patient's condition did not improve might be the short time she spent in the Rehabilitation Department, two weeks being insufficient to alleviate a disorder that had evolved over ten years. Patient's compliance and daily continuance of the physiotherapy exercises learned during her stay might correct the patient's posture and balance in the long term and alleviate her chronic back pain. Also, periodical readmissions to the Rehabilitation Department where her physical therapy program could be readjusted might be helpful in easing the patient's symptoms.

## Conclusions

1. Camptocormia is a rare disorder that is usually associated with various disorders. Our patient was diagnosed with idiopathic camptocormia since we did not find any related pathology that could cause her postural disorder.
2. Early diagnosis is crucial for the efficiency of rehabilitation treatment. In the case of our patient, the disorder had been evolving for years, making complete rehabilitation difficult.
3. With periodical readmissions to a rehabilitation department and the continuance of the learned physical exercises at home, the status of our patient might improve in time.

## Conflict of interest

The authors had no conflict of interest.

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## REVIEWS

# Pedagogical considerations regarding the synoptics of variables with disruptive influence in a pedagogical experiment

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### Abstract

The “system” approach of the variables that govern a “functional unit” of experimental nature evidences the fact that in pedagogical research, effects are changed not only by causes, but also by other variables, susceptible of generating knowledge errors. An experimental result, unaffected by *gross errors* or *systematic errors*, can be affected by *random errors*. Unrecognizing the types of errors that may influence the research, the conditioning relationships between these and the variables that trigger them can seriously affect the experimental strategy, with easy-to-understand consequences on the objectives pursued. The same undesired effects may occur when the negligence of the researcher manifests by omitting the “(re)calibration” of experimental conditions at certain time intervals. Identification of disruptive variables that can appear in pedagogical research is an indispensable “prophylactic measure” as early as the pre-experimental phase.

**Keywords:** disruptive variables, pedagogical experiment, *random errors*, *systematic errors*, *gross errors*.

## Introduction

Any didactic approach (of experimental or other nature) should lead to the formation, development and valorization of the motor and spiritual potential of an individual, regardless of the complexity of the pursued objectives, the sample size, the bio-psycho-information and time resources allocated to pedagogical investigation (Cristea, 2017; Gherasim & Butnaru, 2013).

An inventory of the types of errors from a philosophical or statistical-mathematical perspective (areas in which the knowledge of truth and differences between people revolves around truth and falseness) is part of the subject approached only as far as we reject the fact that error is the null result in the field of knowledge - Descartes and we accept as a hypothesis the fact that there is no *tabula rasa*, as knowledge cannot start from scratch - Karl Popper (Marcus, 2011; Lupșa & Hacman, 2012; Schopenhauer, 2012; Popper, 2017).

Beyond the connotations taken by the relationships: “unsuccess – failure – error – defect – falseness/progress – efficiency – performance – success – truth” or “adaptation – development/evolution – progress”, in didactic activity all these terms revolve around subjects and the educational act. Today, the conditions of potentiation of subjects’ skills are easier to predict, because the determinants of success do not generate as many controversies as those causing

unsuccess or failure (Minder, 2011). This aspect is due to the two approaches complementary to the “pedagogy of success”: “preventive pedagogy”, which develops “anticipation and regulation procedures” (Grangeat & Meirieu, 1997), and “supporting pedagogy”, which proposes “*a priori* help” (Tardif & Couturir, 1993).

## Functional particularities regarding the cause-effect relationship, in a pedagogical experiment

Prefiguring the most effective methodical route to be taken by the subjects included in an experimental program, the initiator of the approach will follow the sequence of concrete teaching-learning and/or evaluation situations, designed to eliminate randomness and ambiguity, to prevent undesired events and the appearance of errors. From these coordinates, an experimental setting will be based on a series of interconnecting elements that influence and condition each other, which will directly impact the cause-effect relationship (Fig. 1).

The matrical nature of the “functional unit”, generated by the cause-effect relationship, has in its structure: input components (cause), state components (x, y, z), and output components (effects). Effects (consequences), i.e. system output variables (dependent variables), change if causes also change (input variables or state mechanisms). It follows that the effect will always be dependent on

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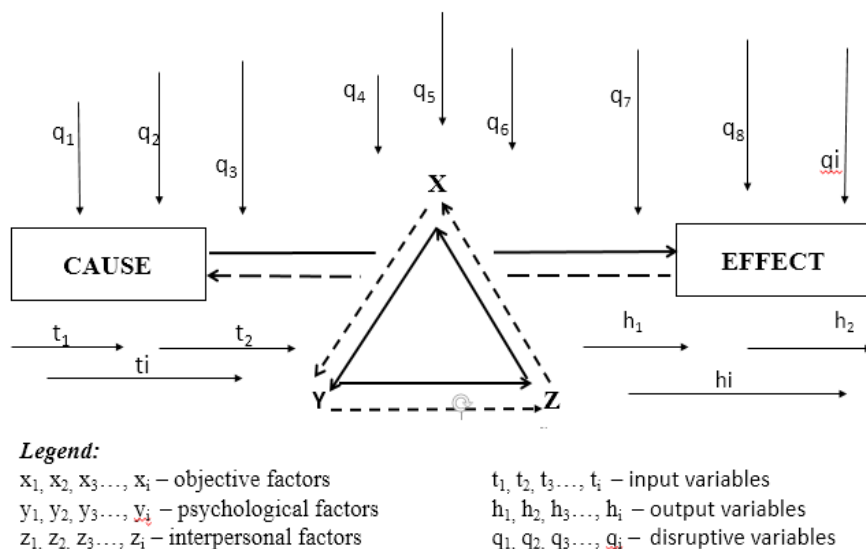


Fig. 1 – The “functional unit” of the cause-effect relationship in a pedagogical experiment.

the cause and cannot be controlled by the initiator of the pedagogical experiment. Thus, the initiator of the experimental approach becomes the observer of the cause-effect relationship and not its initiator (Gagea, 1999; Tofler, 1997).

By particularizing, it could be estimated that the performance of the didactic process (output variables:  $h_1, h_2, h_3, \dots, h_i$ ) would be constant at the pre-established values of input variables ( $t_1, t_2, t_3, \dots, t_i$ ) unless a number of disruptive variables acted on the pedagogical experiment ( $q_1, q_2, q_3, \dots, q_i$ ), which are susceptible to cause errors in the measurement result.

### Synoptic picture of variables with disruptive influence in a pedagogical experiment

Significant or without influence, systematic or random, errors are determined either by variables generated by subjects or by the leader of the experimental process.

If *random errors* are caused by the brutal action of external factors, other types of errors that may occur are *systematic errors*. These can be caused either by subjects or by the negligence of the researcher – by omitting the “(re)calibration” of experimental conditions at certain time intervals. The corroborated influence of several *systematic errors* may determine a *gross error*.

The results of measurements affected by *gross errors* cannot be used, being excluded from the set of observations, but the results affected by *systematic errors* can and will be used after their correction (through their elimination). Ideally, these errors should be highlighted more concretely, by repeating the experiment, as it is known that such errors have a *Student distribution* (Fan, 2001; Vasile, 2016).

Unlike a technical experimental setting, pedagogical research is constantly marked by either a *systematic error* or a *random error* (most frequently created by a psychophysiological factor). Systematic errors have the highest frequency, they are surprising, they cannot be

always intuited and they directly leave their mark on the pedagogical experiment.

If *random errors* are haphazard and cannot be predicted, *systematic errors* must be detected early, eliminated or carefully monitored, because the corroborated action of several *systematic errors* can lead to *gross errors*.

However, a *gross error* can also be diminished – by reducing its severity or even suppressing it – if adequate procedural resources are available to act directly on the cause (Fig. 2).

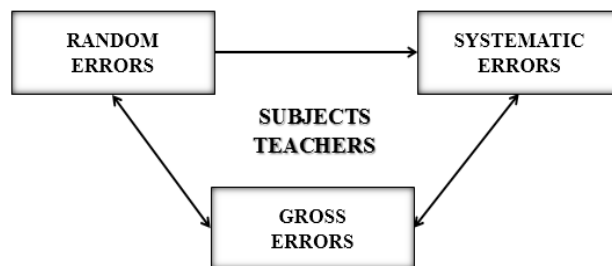


Fig. 2 – The conditionality relationship of errors in a pedagogical experiment

The “cold” statistical characteristics, objective only from the outside, can only provide an incomplete picture of the researched phenomenon – strictly to confirm or refute the hypothesis (Cucoş, 2017). From a psychopedagogical perspective, the application of a canonical research methodology would involve the detachment of the researcher from the subjects, which is impossible to achieve 100%, this percentage remaining an ideal “in the clear, semantic meaning of the word” (Neagu, 2018). Under these circumstances, understanding the subjectivity behind the “answers” objectively externalized by the subjects increases the complexity of the analysis and interpretation of the collected data (Iluţ, 1997).

## Conclusions

1. The permanent, uncontrolled or tolerated action of disruptive variables confers a random characteristic to the results of the experiment, the output variables determining errors in the measurement result.

2. In all research stages, a didactic “prophylaxis of errors” is necessary. This measure will ensure scientific accuracy in assessing the results obtained.

3. The management of the pre-experimental and post-experimental error elimination process in a study should not remain a random concern or, worse, an intention, because this would make the research obsolete.

4. Even if the inventory of variables with disruptive influence on the pedagogical experiment is not at all effaced, the synoptic view of the system (regardless of its size) and the constant (re)calibration of experimental conditions remain the only guarantee of the validity of the data obtained and their extrapolation in the field of knowledge.

## Conflicts of interest

There are no conflicts of interest.

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# Shock wave therapy applications in Sports Medicine

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## Abstract

Shock wave therapy has been successfully applied since the early 1990's. Shock wave represents a sudden change of acoustic wave pressure, which carries high speed energy through different tissues, of which speed is higher than sound speed. Biological processes that have been described at cellular level following shock wave applications have been mentioned by authors in a large number of scientific studies. Therapeutic indications have been integrated by the International Society of Medical ShockWave Treatment. Shock wave therapy has multiple applications even in athletes' specific pathology, with limited side effects and contraindications.

**Keywords:** shock wave, athletes, cellular level, sports medicine.

## General considerations

Sound is a mechanical longitudinal wave, which can travel through any type of medium except for traveling through a vacuum. A sound wave results from a variation of pressure and is characterized by its amplitude, intensity, volume, speed and frequency (\*\*\*, 1998-2019).

The speed of sound varies depending on the conditions of the environment it travels through, being approximately 345 m/s through air and increasing with the rise in air temperature. Acoustic frequency is measured in Hertz, the human ear being capable of detecting sounds with frequencies between 20 Hz and 20 kHz (Dietz-Laursonn et al., 2016).

A shock wave is a sudden, almost discontinuous change in pressure, with a propagating speed that is higher than the local speed of sound in the medium it travels through.

A focused shock wave is described as an impulse that is characterized by:

- a wide frequency range, between 150kHz-100MHz;
- high amplitude pressure, with sudden variation - up to 150 Mpa;
- a low traction wave - up to 25 Mp;
- low pulse depth – reduced penetration;
- a short pressure rise interval - up to a few hundred nanoseconds – non-periodicity.

## The mechanism of action

A shock wave will be subject to the laws of physics: reflection, refraction, diffraction and absorption. Thus, the

amplitude, as well as the shape of the acoustic field can be changed by interacting with different layers of tissue inside the human body. Shock wave reflection through air determines these changes. Because approximately 99% of shock waves pass through air bubbles, a contact substance is used between the probe of the shock wave generator and the patient's skin, which interferes with the human body.

Any shock therapy applied in the vicinity of air interfaces, such as the intestines or lungs, might lead to injury to those tissues, causing serious adverse effects (Pishchalnikov et al., 2006; \*\*\*, 1998).

The parameters of focused shock wave therapy, such as absorbed energy, density, pressure range and spatial expansion of shock waves, are defined as standard IEC (\*\*\*, 2019).

The shock wave is actually an acoustic wave that carries very high levels of energy which are transmitted to painful spots and to the musculoskeletal tissue with subacute, acute or chronic damage. This energy causes regeneration and repair processes of the bones, tendons or soft tissues.

The kinetic energy of the projectile created by the compressed air is transferred through the transmitter to the terminal end of the applicator and further to the tissues (Wang et al., 2006).

## Therapeutic biological effects

High-energy acoustic waves used in shock wave therapy

The following biological processes take place simultaneously:

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1. Formation of new blood vessels - a blood flow rich in nutrients is absolutely necessary to initiate and maintain tissue repair processes. The application of shock waves causes capillary micro-breaks in the treated tendons and bone structures. Due to these micro-breaks there is increased expression of growth factors for angiogenesis: eNOS (nitric oxide synthase), VEGF (vascular endothelial growth factor), BMP-2 (bone morphogenetic protein). The newly formed blood vessels improve oxygenation and circulation in the treated areas, resulting in accelerated healing of tendons and bone structures.

2. Reduction of chronic inflammation. Chronic inflammation occurs when the body's inflammatory response is not permanently stopped. It can cause injury to healthy tissues resulting in chronic pain. Mast cells are a key component of the inflammatory process. Their activity is stimulated by the widespread use of acoustic waves. This process is followed by the production of proinflammatory cytokines and chemokines, which in the next stage determine the restoration of the normal healing and regeneration process.

3. Stimulation of collagen production. The production of sufficient collagen is a necessary precondition for the repair processes of the muscle and ligament structures. Shock wave therapy accelerates procollagen synthesis, thus forcing the alignment of newly formed collagen fibers into longitudinal structures that cause the healed tendon to become denser, stiffer and firmer.

4. Dislocation of calcified fibroblasts. Abnormal calcium deposits occur as a result of microtrauma or other types of trauma to the tendons. Acoustic waves dislocate these calcifications. Shock wave therapy initiates the biochemical decalcification of the constituent deposits (having the consistency of toothpaste), thus healing the tendon. As a result, granular calcium particles will be resorbed by the lymphatic system.

5. Dispersion of "substance P" - pain mediator. Substance P is a neurotransmitter that mediates the transmission of pain information through type C fibers. This neuropeptide is associated with intense, persistent chronic pain, relocating pain signals to the central nervous system. Shock wave therapy contributes to a decrease in the concentration of substance P, which reduces the stimulation of nociceptive fibers, thus reducing the intensity of pain, as well as inflammatory edema (Wang et al., 2016) (1).

6. Inactivation of trigger points. Trigger points are the main cause of pain in the spine or limbs. They represent the most sensitive circumscribed point from a band of palpable contracture in skeletal muscle fibers. Shock wave therapy is a treatment modality used to inactivate trigger points. The assumed mechanism of action is that the emitted acoustic energy unlocks the calcium pump by releasing this electrolyte into myofilaments, which leads to the desensitization of that trigger point, followed by analgesia (Travell & Simons, 1983) (2).

### Therapeutic indications

The International Society for Medical Shockwave Treatment (ISMT) decided through its management board to publish clinical recommendations for the use of shock wave therapy in 2016. Their recommendations are based

on corroborating the results of numerous clinical studies.

The therapeutic protocol is recommended only as a result of clinical-functional examination of the patient, imaging determinations, laboratory tests, as well as other investigations, where appropriate, all aimed at highlighting the diagnosis (Eid, 2016).

#### 1. Approved standard indications:

- *Chronic tendinopathy*: calcifying tendinopathy of the shoulder, lateral epicondylopathy of the elbow (tennis elbow), greater trochanter pain syndrome, patellar tendinopathy, Achilles tendinopathy, plantar fasciitis.

- *Bone pathologies*: delayed bone healing, pseudarthroses, stress fracture, avascular bone necrosis without articular derangement, osteochondritis dissecans without articular derangement

- *Skin pathologies*: delayed healing or lack of wound closure, skin ulcers, non-circumferential burn wounds

#### 2. Empirically tested clinical indications:

- *Tendinopathies*: rotator cuff tendinopathy without calcifications, medial epicondylopathy of the elbow, adductor tendinopathy syndrome, pes anserinus tendinopathy syndrome, peroneal tendinopathy, foot and ankle tendinopathies.

- *Bone pathologies*: bone marrow edema, apophysitis of the anterior tibial tubercle, anterior tibial stress syndrome.

- *Muscular pathologies*: myofascial syndrome, muscle sprain without tearing.

- *Skin pathologies*: cellulite

#### 3. Exceptional indications:

- *Musculoskeletal pathologies*: osteoarthritis, Dupuytren disease, plantar fibromatosis, De Quervain disease, trigger finger

- *Neurological pathologies*: spasticity, polyneuropathy, carpal tunnel syndrome

- *Urological pathologies*: chronic pelvic pain syndrome, erectile dysfunction, Peyronie's disease

- *Others*: lymphedema

#### 4. Experimental indications:

- Heart muscle ischemia

- Peripheral nerve lesions

- Central nervous system pathology

- Skin calcinosis

- Periodontal disease

- Jawbone pathologies

- Complex regional pain syndrome (algoneurodystrophy)

- Osteoporosis

In sports medicine, patients suffering from shoulder tendinopathy, epicondylopathies, plantar fasciitis, calcaneal spurs, achylodynia, contractures / trigger points of the trapezius muscle, bursitis, tendinopathies, osteoarthritis of the knees, or coxofemoral joints benefit from shock wave therapy.

Numerous scientific studies, most of them clinical, demonstrate the benefits of shock wave therapy.

Thus, 95% of patients with knee osteoarthritis treated with shock waves responded positively by a minimization of pain, a reduction of joint stiffness and an improvement of functionality (Sheveleva & Minbaeva, 2014). Knee osteoarthritis has deterioration and loss of cartilage as a

pathophysiological substrate, changes of the subchondral and periarticular bone with pathological sclerosis, bone cysts and osteophyte formation. In the animal model of knee osteoarthritis, it has been demonstrated experimentally that shock wave treatment resulted in remodeling of the subchondral bone and reduction of articular cartilage deterioration (Wang et al., 2017).

Shock therapy has also been shown to be effective for lateral epicondylitis, as evidenced by another clinical study (Dobreci & Dobrescu, 2014). Lateral epicondylitis usually occurs in sporting subjects who play tennis, but also in violinists, surgeons, dentists, people who use the computer keyboard and mouse constantly (e.g. secretaries, accountants), with an increased incidence among adults aged between 40-50 years. Conventional therapy is complex in this pathology, and the recurrence of symptomatology is relatively increased at around 3 months. In cases refractory to conventional therapy, shock wave treatment with bi-weekly frequency is indicated. In these cases, shock wave therapy resulted in pain reduction on the visual analogue scale, lack of pain upon palpation, as well as improvement of daily activities.

Shock wave therapy has also proven its safety and efficacy in refractory cases of *chronic plantar fasciitis*, resulting in a 72.1% reduction in pain, improved function and improved quality of life (Gerdesmeyer et al., 2008).

*Chronic tendinopathy of proximal hamstrings* is an overuse syndrome whose treatment is non-invasive. Shock wave therapy results in reduced pain and improved mobility compared to conventional therapy - non-steroidal anti-inflammatory drugs, physiotherapy, kinetotherapy (Cacchio et al., 2011), as demonstrated in a study carried out by professional athletes.

Shock wave therapy is also effective for insertion tendinopathies, such as *medial tibial stress syndrome*, a disease commonly encountered in professional athletes, which causes pain along the path of the posterior tibial nerve, at the solitary muscle level. Thus, 85% of patients resumed sports activity much faster than those who had used conventional therapy (Rompe et al., 2010).

*Lumbar facet joint pain syndrome* contributes to one third of lumbosacralgia cases, being common both in the general population and in athletes in particular. Shock wave therapy led to significant pain reduction on the visual analogue scale in these patients compared with corticosteroid infiltration and radiofrequency neurotomy (Nedelka et al., 2014).

Shock wave therapy is also useful for *greater trochanteric pain syndrome*, having long-term results (patients were followed up for 1 year). Greater trochanteric pain syndrome has a tendinopathy of the buttocks as a substrate, often caused by overloading, frequently found among athletes (Furia et al., 2009).

*Chronic Achilles tendinopathy* is caused by mechanical overload, being the most common disease in sports medicine, equally distributed among athletes and sedentary people. Conservative therapy, consisting of changes in sports activity, plantar supports, stretching exercises, non-steroidal anti-inflammatory drugs, conventional physiotherapy, has less proven results. From the published studies to date, it appears that shock wave therapy is an

effective treatment option for patients with chronic Achilles tendinopathy (Gerdesmeyer et al., 2015).

Shock wave therapy has proven effective in treating *adhesive capsulitis*, a disease that causes significant discomfort in performing daily activities, limiting the arch of movement in the affected shoulder (especially external rotation), and pain at rest and especially during active or passive movements. In these patients, shock waves stabilized tissues by accelerating the healing process, facilitating angiogenesis, improving blood flow in the affected area (Lee et al., 2017).

## Contraindications

1. *Contraindications of low energy radial shock waves:*

- Malignant tumors in the treatment area
- Pregnant uterus in the treatment area

2. *Contraindications of high energy shock waves:*

- Lung tissue in the treatment area
- Malignant tumor in the treatment area
- Epiphyseal plate in the treatment area
- Central nervous tissue in the treated area
- Severe coagulopathy
- Pregnant uterus in the treatment area

## Conclusions

Shock wave therapy is considered a safe and effective method for treating numerous pathologies in the musculoskeletal sphere, having positive biological tissue repair and regeneration effects through clearly defined mechanisms, contraindications being limited.

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# The structure of outdoor adventure education programs and their regional distribution in Romania

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## Abstract

The present article focused on two aspects, i.e. the identification of the modern theoretical components that define outdoor adventure education and the distribution of these specific activity programs in Romania. Along with formal, non-formal and informal education, outdoor adventure education holds the tools needed to create the image of the European student. Creating and adapting the activities that belong to a component or the interrelation between them is the main objective of the program managers.

The purpose of the article was to identify common contents in order to achieve a classification of the specific defining components regarding adventure education activities, to identify activities according to their usage degree and to the programs used in the development regions.

The research was carried out during the year 2018 and presents a classification of the specific activity programs on 5 components: educational, adventure, nature, recreation and environment. The content of adventure programs is based on the notion of recreation, but they presuppose a number of skills and values that are extremely useful for real life, with a major contribution to the development of social, personal, management and motor skills.

In Romania, we have identified 39 programs, specific to adventure education, the southern region having the maximum number of programs, i.e. 13, which represent 33.29% from the total number of activities. The main activity is represented by games or walking on ropes mounted in the forest at higher or lower distance from the ground, climbing and zip lining, in a percentage of 32%.

The practical character of these activities attributes to these programs the idea of extending school physical education by contributing to the formation of a healthy lifestyle and by ensuring the transition from passive to active learning.

**Keywords:** structure of adventure education programs, educational component, adventure component, nature component, recreation component and environmental component, percentage of activities, regional distribution in Romania.

## Introduction

Developing the indispensable skills for an adult in a rapid technological advancement and ensuring an optimal physical condition are the key indicators in the comprehensive education process. They ensure a proactive development in children and adolescents, and the quality with which they are implemented can predict the health status in the later stages of an individual's life.

The possibilities of changing the means of conducting practical activities led us to the idea of performing a research in which we analyzed the structure of a program with specific adventure education (AE) activities. Part of experiential education, AE is found in high-performance

education systems, contributing to the acquisition of general competencies mentioned in the curriculum, as well as social, cognitive and non-cognitive abilities.

The EU physical activity guidelines aimed at improving health (the EU Working Group "Sport and Health") called for special attention to be paid to physical and mental health problems caused by the decline in physical activity among young people, together with an increase in sedentary lifestyle and obesity. They estimated that up to 80% of school-age children are engaged in physical activities only at school and that they should have at least one hour of moderate-intensity physical activity daily. Sufficient time devoted to physical activity in school, both within the formal curriculum and by means of extracurricular

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activities, can bring a key contribution to a healthier lifestyle (\*\*\*, 2013).

The diversification and restructuring of the physical education lesson content can ensure the continuous participation of students in practical activities. Indoor or outdoor movement games represent the ideal tool by means of which students can acquire a healthy lifestyle on a long-term basis (Iconomescu et al., 2018; Iconomescu et al., 2013).

Especially in primary school, in order to ensure an active participation throughout the practical activity, which will develop both attention and concentration, games represent the ideal means of organization (Talaghir & Cherepov, 2018).

Specialists in the field define AE as a variety of activities and of teaching and learning experiences that involve using a natural environment with elements of real or perceived danger or risk. The content and outcome may be influenced by the participants' actions and circumstances (Ewert & Sibthorp, 2014).

The outdoor AE specific activities can be considered complementary to other forms of movement, equivalent to the most natural human needs based on the skills acquired during schooling, on a different genetic background from one individual to another (Moldovan, 2015).

Scientific research shows that AE significantly contributes to the physiological and psychological benefits brought by recreational activities by reducing stress and the incidence of depressive symptoms. The activities implemented within the programs contain inherent physical, cognitive and emotional challenges, specially created to meet the proposed objectives (Shellman & Hill, 2017).

A research conducted by Save the Children Romania in 2018 showed that about 8 out of 10 pupils between the ages of 12 and 17 years constantly watch online content, 63.7% use the Internet to learn what interests them, 51.9% play and about 27% spend more than 6 hours online during a regular school day. The same research points out the tendency towards a constant increase in the time spent in the online environment, by comparing statistical data from studies carried out in 2010, 2013 and 2015 (1).

An analysis of these data shows that the schooling period no longer involves the development within the integrated education system and the use of free time to deepen and develop the necessary skills. The activities specific to free time, dedicated to non-formal and informal education, are gradually replaced by the online environment, the educational system failing to integrate them into alternative programs that could provide the necessary means to adopt a healthy lifestyle and develop interpersonal skills representative of the statistical data presented above.

Maximizing proactive behavior towards nature, developing and deepening life skills by means of games and practical courses in specially designed environments are increasingly becoming part of the non-formal educational space in Romania and can represent a valid alternative for the beneficial use of free time. By analyzing the effort specific to outdoor AE activities, one can identify the parameters that may have biological influences in the development of certain motor skills and abilities.

## The components of outdoor AE programs

Programs with specific AE activities or adventure camps, due to their relatively accelerated development, their relatively high demand and the combination of relatively random activities, represent the most important novelty factor for the diversification of outdoor leisure time activities.

The main features of the AE programs complement and maximize the theoretical notions, the social and life skills, which are insufficiently developed within formal education. Their success only confirms that society accepts much more easily the modern citizens, who are multilaterally developed and those who are rooted in the educational reality of Romania.

By means of its specific programs, AE aims to achieve a series of general objectives such as developing socio-personal skills, improving team spirit, improving social relationships as well as developing leadership skills, developing management skills such as organizing, coordinating and evaluating both those who implement AE activities and pupils. At the same time, AE develops the psycho-motor aspect of the participants and creates a logical continuity by transposing them to different training conditions, with objectives and experiences that convey to the participant an idea much closer to what reality means, adapted to the participant's age.

The programs aimed at achieving the objectives are based on five essential components: education, adventure, nature, recreation and the environment (Fig. 1).

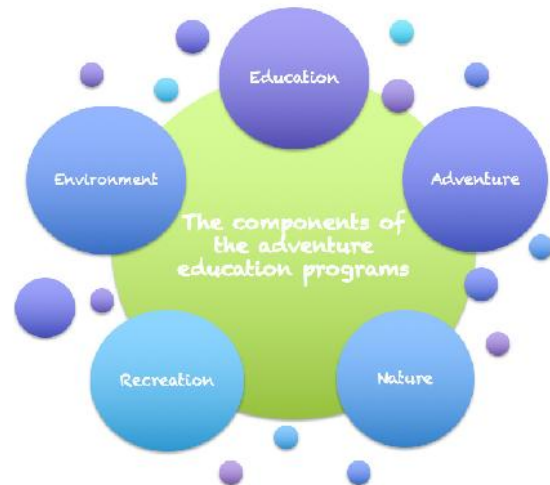


Fig. 1 – The components of outdoor AE programs (original contribution)

### a) Education

Non-formal education transfers its own objectives entirely to the educational component of AE. The participants in the activities access and acquire various types of general knowledge by actively participating in the activities, by performing tasks or by communicating at group level. The information acquired in the above-mentioned ways is much better assimilated by the participants, as it comes in response to their curiosity and to their explicit desire to obtain information in the direction dictated by them.

The research presents increasing evidence regarding the beneficial impact of the education transferred to the area of outdoor activities, but most programs do not have a clear structure and they do not have experimental rigor or value (Quibell et al., 2017).

Studies have been carried out regarding the educational, cultural and leisure impact in urban and rural tourism areas (Leanza et al., 2017), and the latest research in the field supports and encourages the upgrading of the educational process by implementing adventure sports, recreation and entertainment programs, which can contribute to an increase in the participants' intellectual, physical, cultural and social potential (Bădău & Bădău, 2018).

Adventure, or controlled/planned risk, is part of the AE program and represents the key to the success of such a program. Adventure used in the context of activities can be extremely valuable if it is integrated as a concept within them, that is to say it is a part of the outdoor and experiential education.

#### *b) Adventure*

Educational adventure is characterized by the fact that participants take part in activities voluntarily, on their own initiative, no material gain is offered, the only purpose being that of pursuing spiritual satisfaction, the result is uncertain, but educational, and it involves certain dangers.

AE consists of a variety of teaching and learning activities and experiences that involve a close interaction with the outdoor environment, and which may contain a number of elements perceived to have a certain degree of "controlled risk". The results of these activities, due to this experience, can sometimes be considered uncertain, being clearly influenced by the actions of the individuals taking part in them and by circumstances.

Education with the help of planned adventure consists of lessons, programs or internships, also called educational expeditions, in which participants led by a teacher-trainer or entertainer experience one or more planned adventures. The participants are presented with an apparently higher level of risk than their competence, so that at the end of the activity, their self-esteem and interpersonal confidence increase.

By introducing controlled risk in outdoor exercises, the achievement of greater satisfaction is guaranteed, because the most significant challenge, that is the one involving risks, involves a healthy degree of fear and uncertainty about the final outcome (Potter et al., 2011).

#### *c) Nature*

Nature, outdoors, or "outside the walls" represents the space for carrying out the proposed activities. Nature continues to impress by its mere presence and to offer unlimited possibilities of meeting the proposed objectives in a perfect partnership with non-formal education.

AE programs present different combinations of the terms adventure, environment, recreation, education and nature or the outdoors, the latter having the leading potential through its metaphorical greatness and its demonstrable eloquence. Nature is a complex system that may represent both a danger and a partner; therefore AE program managers must select and design the appropriate philosophy of AE (Kim, 2006).

#### *d) Recreation*

Recreation represents an essential objective of AE specific activity programs and is most often found in the answer received from the participants in specific activities to the question: Why did you choose to participate in an AE program?

Free time is the period of time left after work and is made up of the time dedicated to sleep, to personal and household activities, to different social tasks and, last but not least, to recreation. Recreation is a voluntary activity, performed without any constraint, which results in the revitalization of the body and mind. It can also be defined as an activity outside of work, intended for pleasure and enjoyed during rest (Dinu, 2002).

Involving young people in outdoor recreational activities within AE programs aims to raise awareness and participation by experimenting different forms of activity in different environments. Stimulating the young generation to actively participate in recreational, adventure and leisure education activities is an important premise that needs to be strengthened and diversified (Bădău & Bădău, 2018).

The benefits of recreation, and especially of outdoor activities, are numerous and include physiological benefits, as well as a number of mental health benefits, such as reducing stress and the incidence of depressive symptoms, improving general well-being and increasing self-confidence (Orsega-Smith et al., 2004).

#### *e) The environment*

The environment is identified within AE programs as representing the pro-ecological side and translates into the educational environment, into environmental education. This is not only a form of education, but also a tool for solving environmental problems or managing the natural resources.

The combination of environmental education and AE ensures the creation of an essential dimension in recognizing the values of the environment and in defining the concepts that describe the environment, whose main purpose is to improve the quality of life.

AE ensures the practical experience of learning, through direct contact with the components of the environment, it develops data collection and field research skills and stimulates the concern for the environment.

Within the activities specific to AE programs, the environment develops responsibility, increases motivation, the ability to participate in improving its quality and promotes the desire and ability to approach a lifestyle which is compatible with the concepts of sustainable development (Dezso et al., 2010).

The objective of using adventure in education is to help participants develop and evolve through experiences that promote the improvement of physical, cognitive, non-cognitive and emotional factors, as well as the awareness and respect for the environment.

### **Analysis of the activities that make up adventure programs**

Based on a review of the international literature for planning specific activities, we identified five components: adventure, physical activity, nature, guided experience and social environment. To date, research has claimed

that there is no single accepted method to conduct outdoor adventure programs, but there is some evidence suggesting that various informal combinations of the five components improve adolescents' health and well-being (Ian et al., 2018).

Participation in programs with specific AE activities for a minimum period of 5 days ensures a significantly higher level of involvement, physical activity, motivation and self-determination, as compared to the activities performed before or after the school program (Susan et al., 2018).

The main features of AE programs complement and maximize theoretical notions, social and life skills, which are insufficiently developed in formal and non-formal education. Their success only confirms that society accepts much more easily the modern citizens, who are multilaterally developed and rooted in the educational reality of Romania.

A number of 39 AE programs in Romania were analyzed in terms of the activities proposed in the summer camps. Each program proposes 2 main activities per day, for an average period of 6 days, of which one is left for transportation to and from the camp location (Fig. 2).

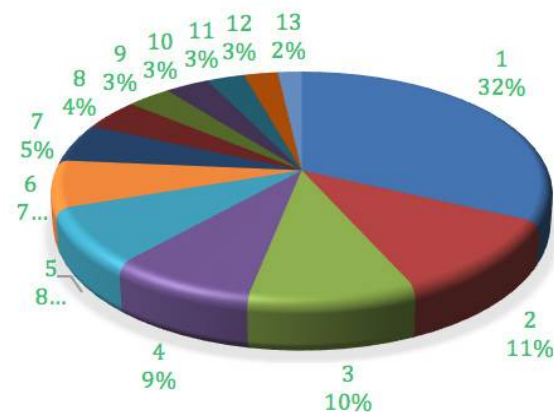


Fig. 2 – Analysis of the activities that make up AE programs.

Following analysis of the activities, the largest share, 32%, is represented by the activities carried out in adventure parks, consisting of games or walking on ropes mounted in the forest, at a higher or lower distance from the ground, climbing and zip lining.

The activity ranking second, with a percentage of 11%, is represented by hiking, followed, and sometimes supplemented, by survival and orientation courses, with 10%.

Representing less than 10% are, in order, sports activities, 9%, outdoor themed games, 8%, treasure hunt, 7%, arts & crafts workshops, 5%, archery and paintball, 4%, first aid courses, day trips, experimental and personal development workshops, 3%, and mountain biking activities, 2%.

### The geographical distribution of adventure education programs in Romania

Visiting recreational and protected areas is increasing in many regions at a global level, including Europe. In

addition to the generalities related to the concept of leisure time, how others spend it and what is actually useful, the benefits of specific AE outdoor activities, respecting the components that define them, can only be assimilated within the adventure camps that exist in our country.

Due to the lack of a culture, of a strategy and a national curriculum integrated in the education system, only very few pupils who are “prisoners” of a performance-based education system, which is inefficient, unproductive and unadapted to reality, will be able to access an adventure camp. For the others, the adventure will have a negative impact, the risk will be uncontrolled, and the development of life skills and of a healthy lifestyle will always be an unattainable goal.

The demand for locations and programs for spending leisure time, with multiple beneficial effects, especially among students, is increasing. The resources involved in outdoor recreation activities require an understanding of the impact on the participants' perceptions. The emotional connections or feelings of attachment to a particular place can influence the relationship between impact and perception (Shantel et al., 2018).



Fig. 3 – The regional distribution of AE programs in Romania (2).

As shown in Figure 3, not all developing regions in Romania benefit from the presence of at least one facilitator of specific outdoor AE activities, for example the South-East region. The South-West region (2.57 %) has a single active program, whereas the North-East region (5.13%) has 2 programs.

In the North-East region we identified 3 specific AE programs that represent 7.71%, and the Western region hosts 9 of the 39 programs existing at national level, that is 23.05%. Over half of the local adventure camps, 24 out of 39, representing 61.53%, are found in the Central and South regions, with 28.24% and 33.29%, respectively.

### Conclusions

1. The role of recreational activities in society goes beyond the dimensions of entertainment activities, these being part of a broader preparation and training program of the citizen for work and social life. Their integration into the school period, by means of non-formal education, and then into the lifelong learning stage, must represent

constant concerns for creating the right framework to ensure and maintain a balance in personal development.

2. The specific AE activities, as compared to general motor skills, ensure the harmony and ease of motor expression through various bodily, playful, sports activities, which require the involvement and coordination of the important muscle groups.

3. Adventure education is an increasingly popular trend, which offers the possibility of psychological and behavioral effects by placing the participant in a natural, unfamiliar environment, within an activity or experience containing a controlled amount of risk. AE holds the cumulated effects of the interaction between education, adventure, nature, recreation and the environment.

4. Specific outdoor AE programs have had a great expansion. This is due to modern research and the world view on education and the demands of the new generations. The advent of adventure parks and the increase in their number in Romania have a major contribution to the development of activity programs with specific content.

5. It should be mentioned that all AE programs are carried out by private equity companies, since so far there is no location in Romania that offers the possibility to participate in outdoor adventure camps through the Ministry of National Education or the Ministry of Youth and Sports, as it is the case in Eastern Europe and the United States of America.

6. The very small number of programs developed on approximately one third of the country's territory brings major disadvantages among the school population regarding the development and experimentation of modern solutions for spending their free time and benefiting from the advantages brought by these programs.

7. There is an inability of the national education system to implement a national strategy that offers all students equal opportunities for sustainable development, focused on modern trends of spending free time in an organized format and with scientifically proven benefits.

## Conflicts of interest

No conflict to declare.

## Contributions

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# Non-invasive ventilation in acute exacerbation of chronic obstructive pulmonary disease: pressure support versus volume assured pressure support

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## Abstract

Chronic obstructive pulmonary disease is a prevalent and debilitating respiratory condition with an important mortality, being ranked as the 4th leading cause of death worldwide. Exacerbations are acute events that appear in the natural history of the disease, contributing to its high mortality and morbidity. With each exacerbation, the patient loses pulmonary function resulting in disease progression and reduced exercise ability. Muscular mass loss is common in these patients and has many causes: lack of exercise due to exertional dyspnea, corticosteroid use and systemic inflammation (more important during exacerbations). The purpose of this review is to analyze the use of conventional pressure control ventilation bilevel positive airway pressure in spontaneous/timed mode versus average volume-assured pressure support ventilation (average volume-assured pressure support and intelligent volume-assured pressure support) in acute hypercapnic respiratory failure due to chronic obstructive pulmonary disease exacerbation in the light of current research. Although intelligent or hybrid modes do not seem to be superior to pressure control non-invasive ventilation in exacerbation, there are however some groups (chronic obstructive pulmonary disease - obstructive sleep apnea overlap syndrome, patients with chronic obstructive pulmonary disease and morbid obesity) that could benefit. As most data are on chronic respiratory failure, more clinical trials are required in this direction.

**Keywords:** acute exacerbation of chronic obstructive pulmonary disease, pressure assured control modes, average volume-assured pressure support, intelligent volume-assured pressure support.

## Introduction

Chronic obstructive pulmonary disease (COPD) is a prevalent and debilitating respiratory condition with an important mortality, being ranked as the 4<sup>th</sup> leading cause of death worldwide (\*\*\*, 2010; Lozano et al., 2012; Laribi et al., 2017). Acute exacerbations of chronic obstructive disease (AECOPD) are acute events that appear in the natural history of COPD, contributing to its high mortality (\*\*\*, 2010).

Data show that 2.5% up to 24.5% of AECOPD patients die during hospitalization and up to 8% in the following month after discharge (Papi et al., 2017; Lencu et al., 2016). Each exacerbation results in deterioration of lung function, which leads to reduced exercise capacity and muscle hypotrophy. Muscle loss is common in COPD patients, and has several reasons (Alexescu et al., 2019; Albu et

al., 2011). The first is reduced activity due to development of dyspnea. The patient will reduce effort intensity to improve dyspnea. The second reason is corticosteroid treatment. Systemic corticosteroids are part of COPD exacerbation; the more frequent the exacerbations, the higher the probability of corticosteroid myopathies. And the last reason is systemic inflammation that characterizes COPD, which is more important during exacerbation. Each one of these factors leads to muscle mass loss and impaired exercise activity. Therefore, one of the main purposes of treatment is to prevent exacerbation.

In patients with severe exacerbation, with hypercapnic respiratory failure and respiratory acidosis (ph: 7.25 - 7.35), non-invasive ventilation (NIV) is a well established therapy, alongside optimal medical and oxygen therapy. NIV refers to the provision of respiratory support through

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patient's upper airway using a mask or similar device. It has been shown to reduce the intubation rate, length of hospital stay and hospital mortality (Kramer et al., 1995; Baudouin et al., 2002; Elliot et al., 2018; Davidson et al., 2016). Current evidence supports the use of pressure control or pressure support modes in acute respiratory failure due to COPD exacerbation (Simmonds & Roussos, 1998; Lightowler et al., 2003; Elliot et al., 2018; Davidson et al., 2016; Hussein, 2016). As 20% of patients are intubated, requiring invasive mechanical ventilation with the associated risks, other modes have been evaluated in order to prevent treatment escalation (Murphy et al., 2012; Hussein, 2016).

## Objectives

The aim of this review is to analyze the use of pressure control ventilation versus hybrid/intelligent ventilation modes [*average volume-assured pressure support (AVAPS) and intelligent volume-assured pressure support (iVAPS)*] in acute hypercapnic respiratory failure due to COPD exacerbation, in the light of current research.

*Bilevel positive airway pressure spontaneous/timed mode (BiPAP S/T)* is a pressure control ventilation mode where the ventilator applies a fixed level of pressure (within a range of minimum and maximum of IPAP settings) and has a back-up rate and a fixed inspiratory time (Papi et al., 2017). Once breath has been initiated, pressure rises depending on the settings to a pressure plateau, where it is held for the duration of inspiration. When inspiratory flow falls below a certain level, usually 25% of peak inspiratory flow, this marks the end of inspiration. Therefore it is the patient who determines respiratory frequency and timing of each breath. If the patient fails to make the required respiratory efforts, the ventilator sets in and completes the respiratory rate. Tidal volume is variable from breath to breath (Papi et al., 2017; Briones et al., 2013). Volume assured pressure support modes (iVAPS and AVAPS) are new spontaneous dual modes using the closed loop technique to obtain targeted tidal volume or alveolar ventilation by adjusting pressure support from one respiratory cycle to another (Briones et al., 2013).

*Average volume-assured pressure support (AVAPS)* maintains a tidal volume equal to or higher than the targeted tidal volume by changing pressure support with every breath between the minimum and maximum IPAP settings. As it averages tidal volume over several minutes, it can adjust the pressure support depending on the patient's efforts. If patient's effort decreases, AVAPS will increase, increasing tidal volume; if patient's effort increases, AVAPS will decrease (Davidson et al., 2016; Briones et al., 2013).

*Intelligent volume-assured pressure support (iVAPS)* targets alveolar ventilation by estimating the dead space using patient's height (Davidson et al., 2016). By targeting alveolar ventilation, iVAPS maintains ventilation according to the patient's metabolic needs, decreasing the risk of inefficient ventilation with changing respiratory rate (Elliot et al., 2018). iVAPS seems to be more physiological and adapted to the mechanism of acute respiratory failure in COPD (alveolar hypoventilation). This leads to impaired removal of carbon dioxide and consequently, hypercapnia. Hypercapnia decreases the ratio between bicarbonate ions ( $\text{HCO}_3^-$ ) and arterial carbon dioxide ( $\text{PaCO}_2$ ), leading to

acidemia. There is however a limitation of these modes. In patients with lung disease in general and COPD in particular, the dead space is increased and is larger than that estimated by height. Furthermore, if patient's tidal volume is higher than the targeted one, the support is reduced (Davidson et al., 2016).

Intelligent ventilation modes have been used for some years in chronic conditions, and in certain subgroups (restrictive disorders) they have been proved to be superior to conventional pressure-support NIV (Simmonds & Hare, 2013; Nilius et al., 2017). In stable COPD, existing data are inconsistent. While there are some studies that found no relevant improvements in prognosis, others reported small improvements in prognosis together with improved quality of life (Briones et al., 2013).

In acute COPD exacerbation, hybrid modes seem to have some benefits compared with conventional non-invasive ventilation, but more data are required. In 2013, Briones et al., comparing the benefits of using NIV with AVAPS versus conventional NIV in acute hypercapnic respiratory failure, found a statistically significant difference in patients from the VAPS group in terms of consciousness,  $\text{PaCO}_2$  levels and peak inspiratory positive airway pressure. Nevertheless, there were no significant differences in terms of length of hospital stay or NIV duration between the 2 groups. Hussien, in a prospective randomized controlled trial, revealed that the intelligent ventilation mode (iVAPS) was not inferior to standard PS ventilation when considering the improvement of respiratory rate, pH, hypercapnia, and oxygenation (Hussein, 2016). However, it should be considered that in the first study, patients had hypercapnic encephalopathy, therefore higher  $\text{PaCO}_2$  values, which could explain the significant difference in the analyzed parameter. In Hussien's study, patients had lower  $\text{PaCO}_2$  values, therefore lower severity. Shaaban et al. concluded in their research presented in the ERS Congress (Shaaban et al., 2017) that patients ventilated with AVAPS showed a more rapid and steady improvement of clinical parameters and a shorter duration on NIV. All studies had small numbers of patients.

In our experience, NIV-pressure controlled - BiPAP ST is the first choice in acute hypercapnic respiratory failure with respiratory acidosis secondary to COPD exacerbation. We switch to hybrid modes (AVAPS) if the patient does not tolerate the ventilator or if there is no clinical improvement. NIV with AVAPS is the first choice in AECOPD in patients with either sleep apnea or morbid obesity, where in our opinion is superior to conventional non-invasive ventilation. In the end, our feeling is that the best ventilation mode, considering the international recommendations, is the one that you are familiar with, as experience is a key factor in NIV success. We use iVAPS, with good results in stable restrictive patients (neuromuscular or thoracic cage deformation), not in acute exacerbation.

## Conclusions

1. Although intelligent modes have not been demonstrated to be superior to classic NIV COPD exacerbation, they are worth a trial in certain situations, as this could provide a better adaptation to the patient's own ventilatory pattern and needs, which vary.

2. Patients with COPD-OSA overlap syndrome and obesity hypoventilation syndrome seem to benefit the most from these intelligent modes in acute settings.

3. A rapid resolution of exacerbation reduces the risk of its complications: intubation and mechanical ventilation, prolonged corticosteroid aggravation of COPD myopathy, and deterioration of exercise capacity.

# Conflicts of interest

Nothing to declare.

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## EVENTS

### Professor Dr. Iuliu Hațieganu celebrated in Dârja, a brand with great reputation (4)

The 4<sup>th</sup> edition of the *Old Fair* in Dârja, held on Saturday 31 august 2019, evoked Professor Iuliu Hațieganu's personality.

Iuliu Hațieganu was born to the family of a Greek-Catholic priest in Dârja village on 14 April 1885, and he died on 4 September 1959. Sixty years have passed since Professor Iuliu Hațieganu's death.

He attended the Superior Gymnasium in Blaj, and subsequently, the Faculty of Medicine of the Cluj and Vienna Universities.

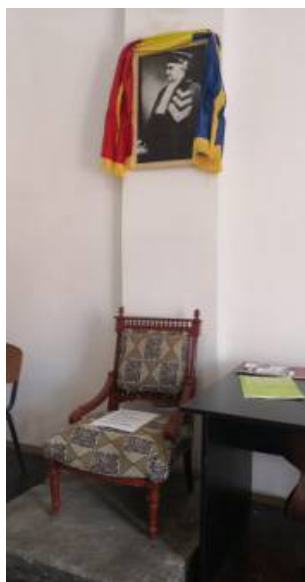
For this year's celebration, local authorities through the efforts of local councilor Ștefan Fluieras inaugurated a room dedicated to the Iuliu Hațieganu museum. The folk dance group of the Iuliu Hațieganu School in Panticeu participated in the event.

Iuliu Hațieganu represents a *brand* for Dârja village and

for Panticeu commune. A brand can be a name. This is *Iuliu Hațieganu*. Country brands cannot exist without local brands which support them and provide a guarantee. To survive, brands should be cultivated. One of the forms of cultivating the *Iuliu Hațieganu* brand is the annual organization of this Old Fair in Dârja. There are other forms of cultivating the Iuliu Hațieganu brand, which can be identified by the Local Council, and then transposed into projects financed from European funds or funds allocated to projects by the Cluj County Council, in partnership with the Cluj County School Inspectorate, the Youth and Sport Authority and the Public Health Authority of Cluj County. These projects should include several mandatory elements: an attractive title, the justification of the need to implement the project, the general and specific objectives of the project, the activities for meeting the objectives, and the beneficiaries of the project.



The newly created *Iuliu Hațieganu* museum room in the Dârja school building.



Armchair in the museum, belonging to Professor Iuliu Hațieganu.



Dance group belonging to the school in Panticeu.

**Traian Bocu**

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## The 100<sup>th</sup> Anniversary Gala of the Cluj University Club

On Saturday 28 September, at 11.00 a.m., the 100th Anniversary Gala of the Cluj University Club, known as “U” Cluj, took place at the Students’ Culture House. The Anniversary started with the National Anthem played by the brass band of the 4<sup>th</sup> Infantry Division Gemina – conductor Daniel Munteanu. Then, the “U” Cluj Anthem was sung by a men’s choir of the Transylvania State Philharmonic – master conductor Prof. Dr. Cornel Groza. The closing piece of music of the Anniversary Gala was the musical composition signed by Călin Goia, the soloist of the Voltaj band, a composition dedicated to “U” Cluj.

The host of the Anniversary Gala was the director of the “U” Club, Ovidiu Vasu who, alongside the moderators Ramona Maxim and Florin Pruteanu, presented all the 21 sections of the club: athletics, boxing, men’s and women’s basketball, bodybuilding and fitness, weightlifting, men’s and women’s handball, judo, swimming, skating, men’s and women’s rugby, cross-country skiing, scrabble, fencing, tennis, men’s and women’s volleyball, horse riding, wrestling. Over time, these sections have earned top positions in national and international rankings (Olympic Games, World Championships/World Cups, European Championships, etc.) through the athletes and trainers of the club selected in the national Romanian teams in various sports and sports disciplines.

Each section was represented on the stage by athletes who empathized with the veterans attending the event and with the audience who had the opportunity to see their past and present idols alive: Vasile Bogdan, Aurel Ursu Palade, Eva Zorgo Raduly/athletics, Floare Anca, Magdalena Pall Jerebie, Mircea Barna, Emerich Vizi, Matei Ruhrig, Aurora Dragoș, Svetlana Simion, Marcel Țenter/basketball, Constantin Tudosie, Gheorghe Zamfir, Marcel Florean, Florina Chintoan/handball, Florin Bercean, Simona Richter, Laura Moise/judo, Octavian Chihai, Radu Munteanu, Ștefan Ionescu, Jean Balint, Petre Motrescu, Gheorghe Sabău, Mircea Rusu/rugby, Doina Meseșan, Sorin Macavei, Marcel Popa, Neculae Pop/volei, Peter Habala, Radu Dărăban/fencing, Titu Turcu/tennis, Septimiu Crivei/scrabble, Virgil Ganea/cross-country skiing, Horia Timiș/skating, Orosz Ecaterina/swimming, Aurel Șuteu/wrestling, Răzvan Sotiriu/horse riding, Mihai Florea/bodybuilding, Octavian Mătiș/boxing.

It should not be forgotten that “U” Cluj also meant football. The following were present: Sorin Bagiu, Remus Vlad, Marcel Lăzăreanu, Vasile Dobrău, Simion Moguț, Alexandru Matei, Stelian Gherman, Dorin Barbu, Patriciu Abrudan, Tiberiu Poratzki, Meszaroș Alpar, Nicușor Bucur, Belodedici, the last being a great surprise.



Image of the Anniversary Gala opening.



The veteran of the oval ball game (rugby), Prof. Dr. Radu Munteanu, former Rector of the Technical University Cluj, addresses the audience.



Group picture of the veteran athletes, at the end of the Anniversary Gala.

**Traian Bocu**  
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## FOR THE ATTENTION OF CONTRIBUTORS

### The subject of the journal

The journal has a multidisciplinary nature oriented toward biomedical, health, exercise, social sciences fields, applicable in activities of physical training and sport, so that the dealt subjects and the authors belong to several disciplines in these fields. The main sections are: “Original studies” and “Reviews”.

Regarding “Reviews”, the main subjects that are presented are: oxidative stress in physical effort; mental training; psychoneuroendocrinology of sport effort; physical culture in the practice of family doctors; extreme sports and risks; emotional determinants of performance; recovery of patients with spinal column disorders; stress syndromes and psychosomatics; Olympic education, legal aspects of sport; physical effort in the elderly; psychomotricity disorders; high altitude sports training; fitness; biomechanics of movements; EUROFIT tests and other evaluation methods of physical effort; adverse reactions of physical effort; sport endocrinology; depression in sportsmen/women; classical and genetic drug usage; Olympic Games, etc.

Among articles devoted to original studies and research, we are particularly interested in the following: methodology in physical education and sport; influence of some ions on effort capacity; psychological profiles of students regarding physical education; methodology in sport gymnastics; selection of performance sportsmen.

Other articles approach particular subjects regarding different sports: swimming, rhythmic and artistic gymnastics, handball, volleyball, basketball, athletics, ski, football, field and table tennis, wrestling, sumo.

The authors of the two sections are doctors, professors and educators from university and pre-university education, trainers, scientific researchers etc.

Other sections of the journal are: the editorial, editorial news, reviews of the latest books in the field and others that are rarely presented (inventions and innovations, university and pre-university programs, forum, memories, competition calendar, portraits, scientific events).

We highlight the section “The memory of the photographic eye”, where photos, some of which extremely rare, of sportsmen in the past and present are presented.

Articles signed by authors from the Republic of Moldova regarding the organization of sport education, the variability of cardiac rhythm, the stages of effort adaptability, and articles by some authors from France, Portugal, Canada must also be mentioned.

The main objective of the journal is highlighting the results of research activities, as well as the permanent and actual dissemination of information for specialists in the field. The journal assumes an important role in the achievement of necessary scores by the teaching staff in university and pre-university education, as well as by doctors in the medical network (through recognition of the journal by the Romanian College of Physicians), regarding didactic and professional promotion.

Another merit of the journal is the obligatory publication of the table of contents and a summary in English for all articles. Frequently, articles are published in extenso in a language of international circulation (English, French).

The journal is published quarterly and papers are accepted for publication in Romanian and English. The journal is sent by e-mail or on a floppy disk (or CD-ROM) and printed, by mail to the address of the editorial staff. The works of contributors that are resident abroad and of Romanian authors must be mailed to the editorial staff to the following address:

### **Health, Sports & Rehabilitation Medicine**

Chief Editor: Prof. Dr. Traian Bocu

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### Objectives

Our intention is that the journal continues to be a route to highlight the research results of its contributors, especially by stimulating their participation in project competitions. Articles that are published in this journal are considered as part of the process of promotion in one's university career (accreditation that is obtained after consultation with the National Council for Attestation of University Titles and Diplomas).

We also intend to encourage the publication of studies and research that include relevant original elements, especially by young people. All articles must bring a minimum of personal contribution (theoretical or practical), that will be highlighted in the article.

In the future, we propose to fulfill criteria that would allow the promotion of the journal to superior levels according international recognition.

## THE STRUCTURE AND SUBMISSION OF ARTICLES

The manuscript must be prepared according to the stipulations of the International Committee of Medical Journal Editors (<http://www.icmjee.org>).

The number of words for the electronic format:

– 4000 words for original articles;

- 2000 words for case studies;
- 5000-6000 words for review articles.

**Format of the page:** edited in WORD format, A4. Printed pages of the article will be numbered successively from 1 to the final page.

**Font:** Times New Roman, size 11 pt.; it should be edited on a full page, with diacritical marks, double spaced, with equal margins of 2 cm.

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**The images** (graphics, photos, etc.) should be numbered consecutively in the text, with Arabic numerals. They should be edited with EXCEL or SPSS programs, and sent as distinct files: “figure 1.tif”, “figure 2. jpg”, to the editors. Every graphic should have a legend, written under the image.

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### **PREPARATION OF THE ARTICLES**

**1. Title page:** Includes the title of the article (maximum 45 characters), the first name of the authors followed by their surname, workplace, postal address of the institute and postal address and e-mail of the first author. It will follow the name of the article in English.

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*Background.* Description of the importance of the study and explanation of premises and research objectives.

*Methods.* Include the following aspects of the study:

Description of the basic category of the study: of orientation and applicative.

Localization and the period of study. Description and size of groups, sex (gender), age and other socio-demographic variables should be given.

Methods and instruments of investigation that are used.

*Results.* Descriptive and inferential statistical data (with specification of the statistical tests used): the differences between the initial and the final measurement for the investigated parameters, the significance of correlation coefficients are necessary. The level of significance (the value *p* or the dimension of effect *d*) and the type of the statistical test used, etc. should be mentioned.

*Conclusions.* Conclusions that have a direct link with the presented study should be provided.

Orientation articles and case studies should have an unstructured summary (without respecting the structure of experimental articles) up to a limit of 150 words.

#### **3. Text**

Original articles should include the following chapters which will not be identical with the summary titles: Introduction (General considerations), Hypothesis, Materials and methods (including ethical and statistical information), Results, Discussing results, Conclusions and suggestions. Other types of articles, such as orientation articles, case studies, editorials, do not have an obligatory format. Excessive abbreviations are not recommended. The first time an abbreviation is used in the text, it should follow the term *in extenso*, being placed in parentheses, and thereafter the short form should be used.

Authors must take responsibility for the correctness of the published materials.

#### **4. References**

The bibliography should include the following data:

For articles from journals or other periodical publications, the international Vancouver Reference Style should be used: the first name of all authors as initials and their surname, the year of publication, the title of the article in its original language, the title of the journal in its international abbreviated form (italic characters), number of volume, pages.

*Articles:* Carlos S, de Irala J, Hanley M, Martínez-González MÁ. The use of expensive technologies instead of simple, sound and effective lifestyle interventions: a perpetual delusion. See comment in PubMed Commons below 2014;68(9):897-904. doi:10.1136/jech-2014-203884.

*Books:* Fox SI. Human Physiology. Twelfth Ed. Publ MCGraw Hill. New York, 2011,403-470.

*Chapters from books:* Sternfeld B, Lee IM. Physical activity and cancer: the evidence, the issues and the challenges. In: Lee IM, Eds. Physical Activity and Health Epidemiologic Methods and Studies. New York: Oxford University Press, 2009.

Starting with issue 4/2010, every article should include a minimum of 15 and a maximum of 100 bibliographic references, mostly journal articles published in the last 10 years. Only a limited number of references (1-3) older than 10 years will be allowed. At least 20% of the cited resources should be from the recent international literature (not older than 10 years).

#### **Conflict of interest**

The authors must mention all possible conflicts of interest including financial and other types. If you are sure that there is no conflict of interest, we ask you to mention this. The financing sources should also be mentioned in your work.

#### **Acknowledgements**

The specifications must concern only people outside the study who have had a substantial contribution, such as statistical processing or review of the text in English. The authors have the responsibility to obtain the written permission from

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In the final stage, all materials will be closely reviewed by at least two competent referees in the field (professors and docent doctors) so as to correspond in content and form to the requirements of an international journal. After this stage, the materials will be sent to the journal's referees, according to their profiles. After receiving the observations from the referees, the editorial staff shall inform the authors of the necessary corrections and publishing requirements of the journal. This process (from receiving the article to transmitting the observations) should last about 4 weeks. The author will be informed if the article has been accepted for publication or not. If it is accepted, a period of correction by the author will follow, in order to meet the publishing requirements.

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The Editors will notify the authors in due time whether their article is accepted or not or if there is a need for modifying the text. Also, the Editors reserve the right to edit articles accordingly. Papers that have been printed or sent for publication to other journals will not be accepted. All authors should send a separate letter containing a written statement proposing the article for submission, pledging to observe the ethics of citation of the sources used (bibliographic references, figures, tables, questionnaires).

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- the informed consent of the family, for studies in children and juniors;
- the informed consent of adult subjects, patients and athletes, for their participation;
- malpractice insurance certificate for doctors, for studies in human subjects;
- certificate from the Bioethical Committees, for human study protocols;
- certificate from the Bioethical Committees, for animal study protocols.

This information will be mentioned in the paper, in the section Materials and Methods. The documents will be obtained before the beginning of the study. The registration number of the certificate from the Bioethical Committees will also be mentioned.

Editorial submissions will not be returned to the authors, whether published or not.

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#### **INDEXING**

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