

THE CORRELATION BETWEEN STRAIGHT NECK, IMPROVING OF THE HEART RATE AND RAISING OF THE OXYGEN SATURATION

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Abstract

In this article i have exposed the correlation between the correction of the posture and the improvement of the oxygen saturation and of the heart rate. This thing was possible by using two treatment methods: the trigger points therapy and the global postural rehabilitation. The postural improvement was applied to a woman, aged 37 who works at the desk daily for 8 to 10 hours. Her prolonged incorrect posture was the main cause for developing straight neck. Beside the postural deficiency she has vertigo, increased heart rate and suffers from chronic stress. The process of the posture improvement was made for 6 treatment sessions. The objective of these session was to rebalance the muscular tone of the anterior and posterior neck muscles.

Key words *straight neck, trigger points, global postural rehabilitation*

Introduction

Office work causes a lot of problems in the long term at the postural level, especially when ergonomic rules are not followed to ensure a relaxed working position, such as adjusting the height or distance at which the monitor or chair is located. Spinal deficiencies are caused primarily by the muscular effort to keep the head in a different position from the neutral one for a few hours a day. The average mass of an adult's skull is 5.4 Kg (the equivalent of a bowling ball) and at an inclination of 45 degrees, the body feels a weight of 23 kg which overloads the upper muscles of the body. This pressure is felt in the muscles of the neck, shoulders, vertebral joints, directly influencing the psycho-emotional state^[1].

Sagittal spine problems are encountered in most of the population, they have different severity depending on the particularities of each individual. An accentuated anteriorization of the head implies a significant reduction of the mobility of the cervical spine, especially in the case of rotational and flexion movements of the neck.

[ⁱⁱ] , [ⁱⁱⁱ]. Moreover, cervical stiffness negatively influences static balance among asymptomatic adults [^{iv}].

Cervical pain affects a large part of the population, having a significant impact on health insurance systems, businesses, communities and individual well-being. These pains can be associated, in addition to the flawed posture, with serious health problems such as neoplasms, neurological disorders or infections. Favored factors include repetitive movements in the neck, maintaining the neck flexion, prolonged use of smartphone and laptop [^v].

Over time, studies have shown that incorrect postures maintained for long periods of time create microtraumas in muscle fibers following repetitive stress on the required muscles. The association of sustained effort with a low level of physical activity and a deficiency of vitamins and minerals determines the appearance of trigger points [^{vi}].

In the case of cervical rectitude, there is a muscular imbalance, characterized by shortening of the suboccipital muscles, levator scapulae, pectoralis minor and elongation of the retractor muscles of the scapula, erector spinae and deep cervical flexors [^{vii}].

It is important that the anteriority of the head be diagnosed and treated early because, over time, it produces additional pressure on the joints and tissues associated with the cervical spine. Studies have shown that symptoms such as temporomandibular pain, migraines and musculoskeletal dysfunction are associated with head anteriority [^{viii}].

Respiration is also affected due to the biomechanical imbalance produced by the scalene, SCM and trapezius muscles, which actively participate in respiration [^{ix}].

Thus, the strength of the muscles involved in the breathing process is reduced in people suffering from neck pain and the dynamics of the rib cage is negatively influenced, practically reducing its range of motion [^x].

Heart rate can also be influenced by factors such as: age, body mass, level of physical activity, physical condition, ambient temperature, breathing rate, emotions, cholesterol level, cardiovascular disease or medication. [^{xi}]

For most adults, at rest when the heart is pumping a minimal amount of blood, a normal heart rate is between 60-100 beats per minute [^{xii}].

In the case of athletes, values of about 40 beats per minute can also be recorded at rest [xiii]. A specialist consultation is required when the pulse is constantly below 60 (bradycardia) or above 100 (tachycardia), especially if dizziness, fainting or shortness of breath occurs. [xiv].

Tachycardia has various causes such as: anxiety, stress, fatigue, excessive caffeine consumption, fever, alcohol consumption, intense physical activity, smoking, drug use or electrolyte imbalance [xv].

The context of the COVID-19 pandemic

The current context of the pandemic has had an unfavorable impact on human health and the global economy [xvi], causing a radical change in the way people carry out their professional activity.. With this change, thousands of people lost their jobs, the most affected being women [xvii].

For most who had the opportunity to work from home, most of them in the category of "white collars", the home became both a place of work and relaxation. Most companies prefer employees to work online, precisely to limit physical contact and the risk of spreading the SARS-CoV2 virus. [xviii].

At European level, in 2017, Italy had the lowest number of employees working online [xix] . During the pandemic, their percentage increased to 69%, and globally it is estimated that 81% of the total workforce was affected by the radical changes caused by the pandemic. [xx].

Working from home produces anxiety, isolation, well-being, productivity and work-life balance are affected. [xxi]. Moreover, physical distancing and isolation from co-workers increased the level of irritability, as people could not share their problems, thus being forced to find solutions on their own. [xxii].

However, teleworking allows employees to spend more time with relatives and take care of them when they need to, but eliminates the time that can be allocated to oneself. [xxiii].

In addition to the psychological and social problems that arose with the sudden change of lifestyle, maintaining a relatively fixed and often incorrect posture, led to problems with the spine.

Costs allocated to the treatment of cervical and lumbar problems

For the treatment of low back and neck pain, the amounts allocated are very large. According to the JAMA Journal, between 1996 and 2006 the costs of the American health system are estimated at 3.1 trillion dollars [^{xxiv}].

Costs for treating low back and neck pain have reached \$ 77 billion in private insurers, \$ 45 billion in public health services and \$ 12 billion received directly from patients. In comparison, Americans spent \$ 111 billion and \$ 89 billion on ischemic heart disease in 2016 to treat diabetes [^{xxv}]

The experiment

During the 6 treatment sessions, the global postural reeducation procedures were combined with those of trigger points therapy.

The reason for choosing the two treatment methods is that, in clinical practice, we observed the benefits of each method applied separately but also together. Although the principles on which it is based are different, the objectives are the same: increase the range of motion at the joint level, reduce muscle inflammation, reduce stress levels and speed up the healing process.

Basically, the trigger points method starts from the idea that due to direct trauma, muscle fiber overload or a deficiency of micronutrients, the muscle shortens due to the accumulation of metabolic products, which causes inflammation and reduced joint mobility.

Global postural reeducation, on the other hand, groups the muscles of the human body into two chains (anterior and posterior) and aims, through the use of postures and the reverse myotatic reflex, to regain biomechanical balance. In this case, we are dealing with an anterior predominance characterized by anteriority of the head, leading forward of the shoulders and anteversion of the pelvis.

During the postural re-education processes, two positions specific to this method were used: the "ground frog" (solo wound) useful for balancing the anterior muscle chain, implicitly the orthostatism and the posture on the wall (Control il muro) addressed to the muscles and joints. lower limbs. Global postural rehabilitation procedures are not

recommended to be performed more than twice a week because the positions used involve intense physical exertion, characterized by the simultaneous isometric contraction of several muscle groups, which would cause an excessive accumulation of metabolic products.

In the first two sessions, in the "ground frog" position, it was necessary to use 4 rectangular lifts with a thickness of 5 mm to improve the craniocervical angle and to eliminate the vertigo sensation that appeared in supine position due to the contraction of the suboccipital muscles. With the relaxation of the suboccipital muscles, the lifts were gradually removed, in order to maintain the correct posture of the skull and in orthostatism. This problem was eliminated after the second session, we still needed the lifts in the subsequent sessions.

Moreover, in the first 3 sessions, a shortening was observed in the adductor muscles and iliopsoas, which caused both dorsal decubitus and orthostatism, an involuntary anteversion of the pelvis, which causes pain in the lumbar and sometimes even along the sciatic nerve. , on the back of the thigh.

After performing the two positions, the patient was placed each time on the ventral massage bed, then dorsal to identify and deactivate the remaining trigger points. The permanent goal was to lengthen the muscle fiber to specific anatomical dimensions and regain biomechanical balance.

In dorsal decubitus, the aim was to deactivate the trigger points of the scalenes, SCM, brachial biceps, anterior bundle of the deltoid, quadriceps, iliopsoas and adductors. Ventral trigger points in the lumbar quadrant, long back muscle, suboccipital and dorsal muscles of the cervical region were deactivated.

The acute pain gradually limited the area where they were felt, thus becoming isolated painful points that were subsequently observed only after maintaining the office posture and local pressure. At the fifth session, the pain completely disappeared, and this aspect was also observed in the sixth session.

The research subject

The subject of the study is a 37-year-old woman, working between 8 and 10 hours a day in the office. Drink coffee daily. At a first examination, the resting pulse was 133 and the oxygen saturation was 96%.

At the initial examination, he complained of episodes of vertigo and pain in the cervical region and paravertebral muscles that were activated at the time of breathing, the pain being felt even at the intercostal level. The person also complains of lumbar pain radiating along the lower left limb, which is caused by pelvic anteversion.

Usually, the person sleeps 8-10 hours but despite this aspect, she always wakes up tired, the main cause being the consumption of glycogen reserves during the night.

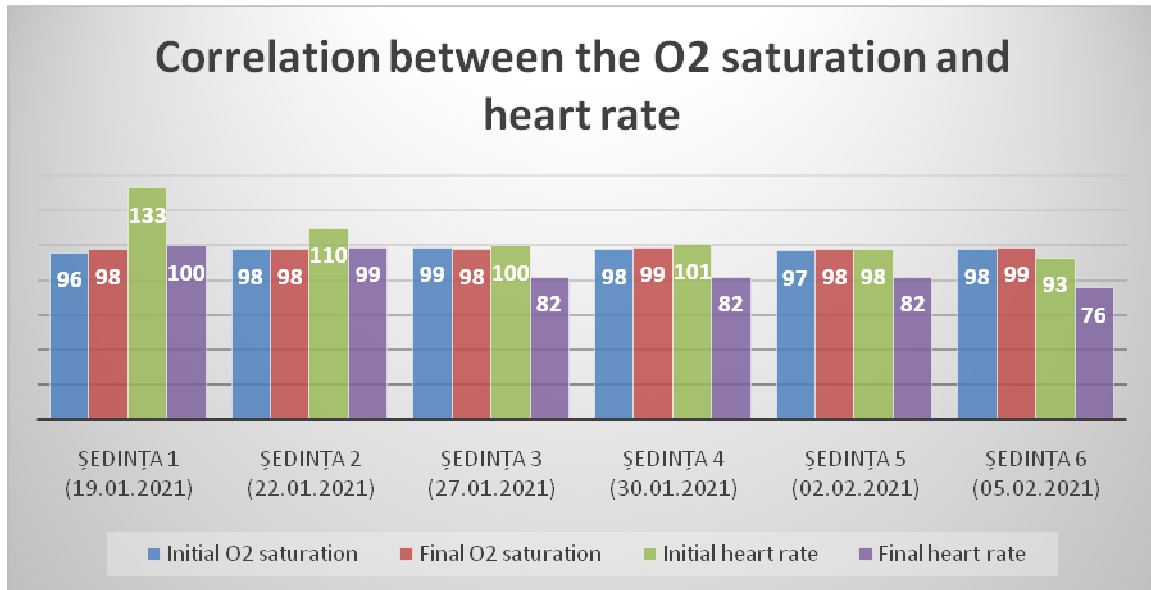
The aim of the study is to show that re-education of posture can significantly improve these parameters without the need to change diet or rest.

The subject of the study was chosen due to the physiological peculiarities determined by the demanding lifestyle, which it presents along with musculoskeletal disorders. In order to determine the connection between the adopted posture and the modification of the targeted physiological parameters, it was necessary to evaluate the anatomical angles specific to the cervical rectitude.

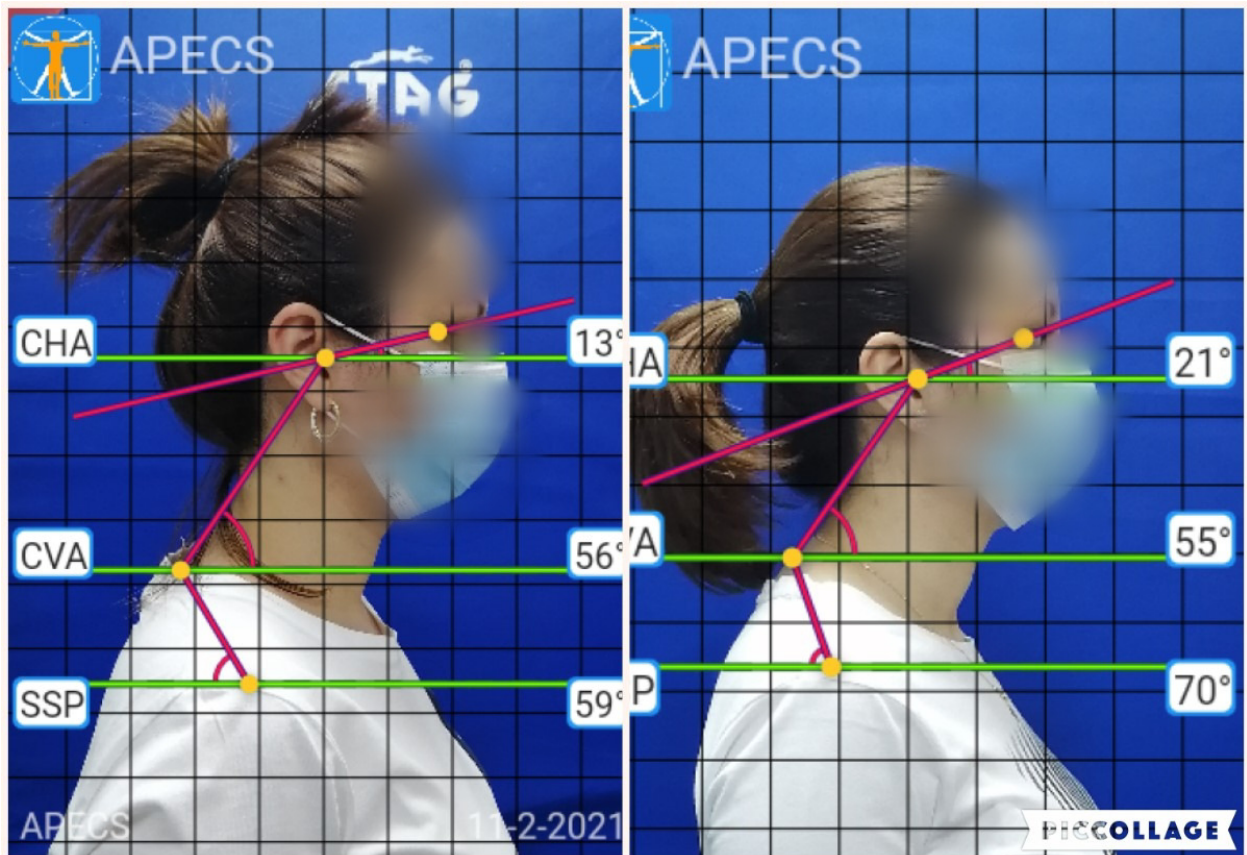
Results

	Date of the session	Initial heart rate	Final heart rate	Initial O2 saturation (%)	Final O2 saturation (%)
1	19.01.2021	133	100	96	98
2	22.01.2021	110	99	98	98
3	27.01.2021	100	82	99	98
4	30.01.2021	101	83	98	99
5	02.02.2021	98	82	97	98
6	05.02.2021	93	76	98	99

[Table 1 ,Correlation between the O2 saturation and heart rate]



[Chart 1 - Correlation between the O2 saturation and heart rate]



[Image 1 –Comparing the results obtained in the first and final session]

No. Session	Date	CHA	CVA	SSP
1	19.01.2021	13	56	59
2	22.01.2021	17	55	76
3	27.01.2021	16	55	73
4	30.01.2021	18	55	65
5	02.02.2021	14	53	71
6	05.02.2021	21	55	70

[Tabel 2 The evolution of the angles between the anatomical marks during the sessions]

Age	Heart rate, 50-85% effort intensity	Heart rate, 100% effort intensity
20 years	100-170 beats per minute (bpm)	200 bpm
30 years	95-162 bpm	190 bpm
35 years	93-157 bpm	185 bpm
40 years	90-153 bpm	180 bpm
45 years	88-149 bpm	175 bpm
50 years	85-145 bpm	170 bpm
55 years	83-140 bpm	165 bpm
60 years	80-136 bpm	160 bpm
65 years	78-132 bpm	155 bpm
70 years	75-128 bpm	150 bpm

[Tabel 3 - Ritmul cardiac specific vârstei și nivelului de efort]^{xxvi}, ^{xxvii}

Conclusions

Following the treatment sessions, a correlation was observed between the improvement of the targeted anatomical angles, the improvement of the respiratory amplitude, the decrease of the heart rate and the increase of the oxygen saturation. The

posture being improved, the subject stated that the pain initially charged in the cervical, thoracic (paravertebral and intercostal) and lumbar area disappeared, and while the stress level decreased.

The decrease in stress levels occurred as a result of the elimination of the inflammatory response caused by the shortening of muscle fibers caused by trigger points resulting from vicious postures maintained over time.

Thus, it can be stated that the combination of the two treatment methods (global postural reeducation and trigger point therapy), can contribute to obtaining a correct posture that positively influences a person's physiological parameters, without the need to change other aspects of lifestyle. .

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