



Conceptual Approach to Low Pressure Fitness

Hypopressives Exercises



Abstract

Low Pressure Fitness (LPF) - Hypopressives Techniques (HT) are global neuromyostatic techniques that adjust musculo-tendinous tensions in visceral, parietal, and skeletal tissues. These techniques are used for the treatment of functional pathologies (urinary, digestive, vascular) in addition to being the main rehabilitation tool during postpartum. Outcomes of the therapeutic use of LPF include an increase in abdominal and perianal muscle tone, a decrease in urinary incontinence symptoms, postural improvements, and a positive effect on postural chain flexibility. Due to these positive results within the therapeutic field, the techniques have been adapted from therapeutic use within physical therapy clinics to preventative use within fitness centers through dynamic HT.

The HT were created by Dr. Marcel Caufriez, Human Movement Science and Rehabilitation Specialist, through his dedication to uro-gynecological re-education. In the 1980s, he named HT "Diaphragmatic Inhalation" (DI), which were developed in a laboratory. The initial objective of DI was to seek a muscular strengthening technique that was beneficial for the abdominal muscles without negative effects on the pelvic floor. In 2006, Dr. Caufriez, with DI basis, created HT for their application to sports performance, prevention and health. They were called Hypopressives exercises or Reprocessing Soft Fitness.

HT are described as an organized series of rhythmic postural and sequential exercises that allow the integration and memorization of proprioceptive and sensitive or sensory messages associated with certain postural positioning (Caufriez, Pinsach and Fernández, 2010). These exercises are carried out in different positions, according to certain patterns, in order to facilitate and enhance the Hypopressive effects characterized by: bringing forward the center of gravity axis, axial auto elongation, shoulder joint decoaptation, costal aperture, and respiratory apnea.

THEORETICAL FRAMEWORK:

The HT boost and create divergent neural networks that trigger a series of short-term systematic reactions such as diaphragmatic relaxation and perineal and abdominal muscles tone activation (Caufriez et al. 2010). This action is initiated and facilitated through a stimulation of the body's sensitive receptors, namely the barosensitive receptors, responsible for the proprioception. Physiologically, the theoretical principle supports that the muscular proprioceptors have a preferred sensory direction in relation to a precisely orientated movement or stretching, elongation of the antagonists (Roll, 2003; Ribot and Ciscar, 2002).



Kinesthetic and sensory stimuli are added to the proprioceptive influx, and these stimuli are transmitted through:

- Large sensitivity afferent pathways, particularly those of the pain;
- Direct spinothalamic pathways that allow for an emergency decoding
- Immediate motor reactivity.

It's concluded that the sum of the specific codifications of each muscle requested by the hypopressive positions allows a perceptive integration at the central nervous system level, ensuring memorization through rhythmic repetition. In practice, each particular position included in the HT exercises has been studied in order to respond to the criteria previously described. One example is the internal rotation of the shoulders, with a 90° (elbow flexion and a wrist dorsal flexion), to its maximum articular capacity. The daily repetition of these exercises creates long-term reverberating neural networks, which means auto-exciting circuits in postural situation.

The consequences of the aforementioned postural and respiratory stimulation lead to the toning via reflex action of the pelvic floor (58% increment of the resting tone) and the abdominal muscles (Caufriez, Fernández, Deman and Wary-Thys, 2007).

Besides the proprioceptive stimulation, as a result of the postural situation derived from the HT, it also carries out a significant respiratory action as it simulates the brain respiratory centers (pneumotaxic center and ventral bulbar respiratory center) and inhibits the inspiratory muscles (apneustic center and dorsal bulbar respiratory center). This pneumotaxic response is the result of the respiratory apnea occurring during the exercises, which triggers a state close to hypercapnia (carbon dioxide pressure, PCO₂ >40mmHg), (Hodges, Forster, Papanek, Dwinell and Hogan, 2002). This induces an increment of the catecholamines hormones secretional level (they exert a dopamine inhibitory action over the dorsal bulbar center).

During the execution of the HT, a voluntary contraction is carried out on the serratus anterior and the ribcage elevator muscles (external intercostal, scalene, sterno-cleido-occipital-mastoid), which are respiratory muscles that also form part of the pneumotaxic center. The auto elongation of the spine will stimulate the respiratory mechanoreceptors (inspiratory nuclei inhibition).

The supraspinal respiratory centers impacts the postural toning and phasic control of the respiratory muscles (superior respiratory pathways, intercostal, scalene, intercostal, sterno-cleido-occipital-mastoid, thoracic diaphragm, abdominal and pelvic floor). Therefore, their activation or inhibition allows the modulation of the postural tension (toning activity) of the muscle group they are related to.

The HT being performed in respiratory apnea and in certain positions that bring forward the gravity axis, manage to reduce the thoracic diaphragm toning activity with its consequent relaxation. The reduction of the intra-abdominal pressure causes the toning of the abdominal and perineal muscles by reflexion, and generates suction over the pelvic bowels by the diaphragmatic elevation and reduces the ligament pressure. (Esparza, 2002).

These reasons show that hypopressives practices normalize the muscular tension, namely the epimeric musculature "spinal extensors" and the hypomeric musculature "limbs and body wall", while improving the phasic (muscular strength, resistance) and respiratory (peak flow) parameters. Other consequences of its practice, noted by some authors, claim a positive incidence on the vascularization of the lower limbs (Caufriez, Governo and Rondeux 1991; Snoeck, Philipot, Caufriez and Balestra, 2009).



SCIENTIFIC EVIDENCE:

In recent years, a study of HT has been initiated in order to evaluate its effects for both pathological and preventive purposes. Some of the more highlighted studies use perineal tonometry to assess the pelvic floor muscular tone, which is directly associated to pelvic floor pathologies and abdominal muscles evaluations. The following is a summary of a few findings from recent research:

In 2007, Esparza implemented a HT protocol on a group of 100 women (average age = 36 years old) that suffered from urinary incontinence and pelvic hypotonia. Results obtained through perineal tonometry after 20 minutes of HT per day during a period of six months: increase in contractile strength (20%), increase in basic tone (58%), and in load tone or "suspension capacity" (48%) (Esparza, 2007).

Similar results were obtained in a 2007 study conducted by Fernández, where the same evaluator was applied on a group of people over the age of 60 (N=24; average=68.5 years old) who performed 20 minutes HT daily during a 6 months period. These results showed the following: an improvement in the rest tone of SP (23.5%), in the load tone (25.3%), in the perineal blockage to the effort (108.4%), and a reduction of urinary incontinence symptoms (85.7%).

More recently, Rial and Pinsach (2010) confirmed the aforementioned results on reduction of urine losses in an intergroup study (N=126; average = 43 years old), where a daily 30 minutes DH practice three times a week during a three months period resulted in a notably reduction of the symptoms of urinary incontinence. Compared to the control group and the pilates group who showed no improvement.

Another piece of evidence associated to the practice of these exercises is the impact on the lower back and lower limbs flexibility. This was evaluated by Galindo and Espinoza (2009) on patients suffering from mechano-postural low back pain. Through an electromyographic analysis both authors confirmed an improvement on the transverse and internal oblique activation time, after carrying out an exercise program based on HT.



THE PRACTICE:

In general, the HT require a command of different systems such as the respiratory and neuromuscular or postural system; therefore, prior to carrying out these HT, it is necessary to execute some functional tests to guide the technician in determining the most appropriate and recommended positions, progression, and intensity. The leisure and preventive aspects of these exercises are carried out by a professional trainer and Physical Activity and Sport Science graduate.

At the beginning, as with any other training program, allow for a learning curve. During the first two weeks, it is advisable to perform between 15-20 minutes weekly sessions. After the first two weeks, it's recommended to carry out daily sessions of 20 or 30 minutes until the so-called automatization or memorization of the exercises and proprioceptive sensations is reached. When the student has assimilated the technique and obtained positive results in the re-evaluations, it is possible to perform a maintenance program consisting of two 30 minutes weekly sessions.



It's important to point out that the HT exercises have some counter-indications for those suffering from hypertension, heart disease, respiratory obstructive dysfunction, and also for pregnant women. Therefore, people who suffer from these pathological diseases should undergo a medical examination and seek advice from a professional and Physical Activity and Sport Science graduate in order to obtain an exercise program according to their situation. In the case of pregnant women, they should seek the advice of a physical therapist specialized in obstetrics or peripartum.

CONCLUSIONS

The HT had been developed for the re-education of the pelvic floor and postpartum recovery. They are rhythmic and postural exercises that produce a pneumotaxic stimuli through hypoxia and hypercapnia. In recent years, they have been investigated inside the spectrum of preventive and healthy exercises. This new line of investigation, aims at a possible tool for the training of the abdomino perineal musculature. The available data leads to the conclusion that the HT generate benefits for urinary incontinence and the coordination between diaphragm, abdominal muscles and pelvic floor. Nevertheless However, it is still a relatively new methodology that needs further investigation.



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