QRS 1010 Pelvicenter

Repetitive peripheral magnetic stimulation to correct functional pelvic floor disorders

Scientific documentation and medical information

Core Strength / Core Stability

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definition

In the medical or physiotherapeutic sense, “core strength” means the “strong (muscular) core” [1] , [2] in the middle of our body. Depending on the existing "strength", the core serves either more or less to stabilize the spine and pelvis [3] , [4] , [5] . The core also acts as a central "turntable" and power transmission center between the lower and upper body, or lower and upper extremities [6] , [7] .

The core consists of the abdominals (anterior), the paraspinous and gluteus muscles (posterior), the diaphragm (above), and the pelvic floor and pelvic girdle muscles below, with the hip flexors and extensors supporting the core (middle) [8] .

However, a “solid” core (Core Strength) is not only essential for the stability (Core Stability) of the torso muscles and for power transmission to the extremities. It drastically reduces the muscular susceptibility to injury and the failure rate (e.g. in athletes)! In addition, from a medical point of view, there is increasing evidence that non-specific, myofascial lumbar back pain is directly related to a core imbalance!

The core muscles can be divided into two muscle groups according to their function and characteristics [9] : The first group includes the deep-seated, stabilizing muscles. They consist of the Mm. lumbar multifidus, obliquus internus and the quadratus lumborum [10] , [11] . Together with the abdominal muscle transferus abdominis they act in a co-contraction. This core muscle group ensures precise motor control and spinal stability [12] .

The second group includes the "superficial" muscles, which are not directly connected to the spine. These muscles cushion the enormous torsional forces from extremity actions [13] . Because they connect the pelvis to the thoracic ribs and leg joints, they provide additional spinal control. The muscles belonging to this group are the rectus abdominis, external and internal obliques, erector spinae, quadratus and hip muscles [14] .

Overall, the core is a force distribution center and is primarily used for the efficient transfer of acceleration and deceleration forces between distal and proximal body segments [15] . A strong core offers high biomechanical efficiency, which is particularly important for running, jumping, swimming, throwing and spike sports [16] . This both in the professional and in the hobby area.

Proximal stability for distal mobility

The slogan “proximal stability for distal mobility” [17] sums it up; the core is the all-encompassing, anatomical basis for all movements of the distal body elements. The core quality is particularly important for throwing, kicking and running sports [18] , [19] .

Most of the major movement muscles of the distal muscle segments (latissimus dorsi, pectoralis major, leg flexors, quadriceps, and iliopsoas) are connected to the core. As well as the main stabilizing muscles for the extremities (lower and upper trapezius, hip rotators and gluteus muscles).

The core player "pelvic floor"

Although 29 different muscles interact in the entire "lumbopelvic" complex [20] , it is striking that the pelvic floor muscles contained in the muscle complex have received little attention in the investigations or studies carried out to date [21] . This is despite the fact that it has been scientifically proven that the pelvic floor not only functions as a continence organ and intra-abdominal counter-pressure system, but also actively shapes posture with its tone [22] .

A study at the Cologne Sports University shows that the pelvic floor muscles co-contract without exception in all postures and movements examined. In comparison, the pelvic floor musculature is actually the most active muscle group, as a percentage of the other derived and superficially directly affected muscles [23] .

Measured by the percentage of MVC (Maximum Voluntary Contraction), the pelvic floor is subjected to twice as much stress when standing up or sitting down or when bending knees than, for example, the gluteus muscles. In segmental stabilization (trunk), the pelvic floor is the most active muscle involved, accounting for 31% of MVC in the concentric phase.

The actual main muscle (M. obliquus internus) contributes to trunk stabilization with only 21%, the obliquus externus with 14% and the Mm. multifidus and erector spinae only with approx. 3 to 5%. A derivable, anticipatory "feedforward reflex", i.e. the pre-control of certain postural and stabilizing muscles before the actual running, kicking, punching or throwing performance takes place, seems to be physiologically implemented in any body movement [24] .

Inadequate core training strategies

The pelvic floor muscles are an essential part of overall core strength. In practice, the majority of core training strategies relate to the abs, back, hips, and adductors. Although the pelvic floor muscles are an extremely important link in the muscular "chain", far too little attention has been paid to them to date. This circumstance may be due to the fact that there is no suitable, easy and effective pelvic floor training available and the "Pelvicenter rPMS" solution is still not well known.

However, the misconception that training the local, deep muscles (Mm. transversus abdominis, lumbar multifidus, obliquus internus and the quadratus lumborum) is sufficient for better core stability and strength development is also widespread [25] , [26] , [27]. , [28] , [29] , [30] . It is well known that a chain is only as strong as its weakest link. If one of the most important core protagonists such as the pelvic floor is only insufficiently or not at all in the training focus, it can be regarded as the weakest

link in the chain. The logical consequence is a reduction in performance, which can even have negative physical consequences.

Peripheral muscle activity versus distally available muscle strength

Athletes tend to focus their training on the extremities that are directly used [31] and thus - unintentionally - weaken the ability of their body to perform optimal, continuous power transfer. The movement sequences are increasingly focused on the trained muscle groups, which are stressed even more because of the deficient adjustment angle ("posture"). If the core is unstable, the muscle strength available distally is reduced, although the peripheral muscle activity is particularly high [32].

Examples: With a quick arm movement, the contralateral gastrocnemius / soleus calf muscles activate first [33], with this activation pattern reaching the arm via the core [34]. The maximum speed of a kicking movement is also more dependent on the hip flexors than on knee extension [35], which can be achieved at a knee angle of 132 degrees. For example, as a result of proximal (core) muscle activation, that of the ankle is 26% stronger [36]. Since less effort is required for a distal movement with maximum proximal muscle activation, this can flow into the punching, throwing or kicking movements with more precision and control [37]. Mainly because the rotational force of the extremities can be implemented better [38].

Injury prevention through core training

Shoulder injuries and pain syndromes (inpingement syndrome, rotator cuff syndrome, tendinopathy of the biceps tendon / brachialis syndrome, tears in the joint lip) are one of the most common disorders in throwing and hitting disciplines in professional and amateur sports [39], [40], because in Fast and powerful overhead movements exert enormous forces on the shoulders.

There are hardly any sports in which a stable and well-trained core strength does not play a role. Balance deficits, which can no longer be regulated by the core, are decisive here, so that the forces have to be fully projected onto the periphery [41]. A core strength that is too weak is also closely related to injuries to the anterior cruciate ligament [42], [43], [44] and other injuries to the lower extremities [45], [46], [47], [48], [49], [50], [51], [52], [53].

core strength increases the risk of injury in athletes
with deficits in hip abduction and external rotation [54]. For example, football players are twice as likely to suffer a strain or sprain [55]. Conversely, 8 weeks of core training reduces injury rates by 42%. In addition, the rehabilitation time after an injury is reduced by 62% [56].

Adequate core training not only reduces the susceptibility to injury in athletes and in physically demanding jobs [57], [58], but also has a clear effect on athletic performance [59], [60].

Core Strength Imbalance and Lumbar Back Pain

In sports such as soccer, golf, tennis, gymnastics, running, football and volleyball, low back pain (LBP) is one of the most common pain events [61] , [62] , [63] , [64] and causes the most downtime. Special exercises, eg for the extensors of the back or general muscle strengthening of the back muscles must be judged as therapeutically rather counterproductive. This also applies to excess sit-up exercises, as they actually increase lumbar pressure [65] .

Independent of a mostly myofascial genesis (see indication Pelvic Pain Syndrome), core strength training seems to be basically effective for lumbar back pain [66] . However, there are no suitable instructions for a suitable pelvic floor training or solutions such as the Pelvicenter rPMS are still too unknown. This is all the more regrettable as the studies on pelvic floor training for non-specific lumbar back pain clearly underline the immense therapeutic importance of pelvic floor training [67] , [68] , [69] , [70] , [71] , [72] , [73] .

rPMS supported core training

If core training does not succeed in achieving pelvic floor stability that goes beyond a normal level, an imbalance with negative consequences develops for the other muscle groups if training dominates. It is important to know that strengthening the pelvic floor is not just about muscular strength, but also about increasing the proprioceptive flow into the central nervous system (CNS).

The control of the corresponding muscle fibers of the pelvic floor can program a "pattern" in the representation center of the brain. rPMS training can improve motor skills [74] , which triggers cortical reorganization processes in the brain and motor skills can thus be called up more quickly [75] .

The recommendation is to add dedicated pelvic floor training to standard core strength training concepts. In the absence of suitable or in-depth training methods, the use of the QRS Pelvicenter with rPMS (repetitive peripheral muscle stimulation) is the most modern and at the same time most effective solution currently available on the market. Because with the rPMS, training effects on the pelvic floor can be achieved that are many times higher than other forms of pelvic floor training.

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