

Lumbar Area

Backache can be avoided by relaxing and stretching the lumbar area and strengthening abdominal muscles using the appropriate exercises in the right order. Lumbar vertebral column and lumbosacral area are the most overloaded parts of the axial system and almost every adult individual suffers from strain. In the lumbar area we relax and stretch hyperactive hypertonic muscles and strengthen abdominal muscles that tend to be weak. Also the pelvis and hip joint are closely related to the lumbar vertebral column. Origin of the muscle imbalance in this area can be of exogenous nature due to overload, e.g. heavy or stereotypical physical work, but more often it takes place as a consequence of faulty body posture or inappropriate movement pattern. Strain of exogenous nature is associated with a typical muscle imbalance referred to as the *lower crossed syndrome* (according to Janda), which, on one hand, results from increased strain in the area, tightness of lower back muscles and hip flexors, and, on the other hand, inhibition and weakness of abdominal and gluteal muscles. To list sport activities typically causing the lumbar area overload is very difficult in this case. There may be no sport activity that would not involve actions such as: lifting, turning, bending forward, bending aside, walking, running, jumping. The list of these activities clearly indicates a probability of harming lumbar part of vertebral column.

Competitive sport:

- volleyball, basketball, hockey games (ice-hockey, field hockey, floorball, etc.)
- combat sports
- downhill skiing, ski jumping, aerial skiing, snowboarding
- weight-lifting
- track and field: hurdling, long distance running, jumps, putting and throwing.
- figure skating, aerobic and rock-and-roll, sport and modern gymnastics

To choose the appropriate exercise forms it is essential to know the location and function of particular muscles:

Muscle	Origin	Insertion	Function
erector spinae	Sacrum	transverse processes vertebrae from ribs to occipital bone spinuous and	bilateral: maintenance of erect posture unilateral: lateral bend and rotation of

		transverse processes	torso
quadratus lumborum	rib (12)	transverse processes vertebrae lumborum ilium	bilateral: extension of lumbar vertebral column unilateral: lateral bend in the lumbar vertebral column
rectum abdominis	pubic bone	sternum ribs (5-7)	bilateral: flexes vertebral column unilateral: lateral bend to same side
external oblique	lowest 8 ribs	ilium, linea alba	bilateral: flexes vertebral column unilateral: lateral bend to same side, rotation to opposite side
internal oblique	Linea alba, ilium, inguinal ligament	last 3 ribs	Bilateral: flexes vertebral column Unilateral: lateral bent and rotation to the same side
Transversus abdominis	last 6 ribs, lumbar vertebral column, ilium, inguinal ligamentum	linea alba	compresses abdominal contents

To compensate the muscle imbalance, which is often more significant due to sport activity as well as long-lasting sitting position or walking in inappropriate shoes, the following exercises are recommended. When exercising, the above-mentioned principles must be followed, which will help reach the desired goal easier.

Number of repetition depends on the performance quality motor abilities of an individual. Certainly, we should not start with a large number of repetition, it should be increased gradually. The suggested number of repetition is 6-8 and later 12-15, series can be repeated.

Relaxing and stretching

Basic position: lying on the back, hands placed on iliac crests.

- when breathing out, stretch right leg far to the distance, rotate the pelvis so that the lumbar arch is lowered, press lumbar area towards the floor (always gradually in three steps) with breathing out to the maximum stretch), the same goes for the left leg

Mistakes: sagging the lumbar area, lifting the buttocks from the floor, backward lean of the head, holding breath

Basic position: lying on the back, arms along the body palms up,

-when breathing out, tilt the pelvis and flatten low back on the floor, keep the whole back evenly flattened on the floor, shift the arms (palms up) towards knees.

mistakes: arching in the lumbar area, bending head back, holding breath

Basic position: lying on the back, arms along the body palms down, when breathing out, tighten your gluteal muscles, tilt the pelvis to flatten the low back on the floor; when breathing out, lift the lumbar area from the floor again, gradually, vertebrae one by one all the way to the shoulder blades, breathe in

- when breathing out gradually, vertebrae one by one return to the basic position, relax the gluteal muscles when rested completely on the floor.

Mistakes: lifting too fast and straining the lumbar area when there is arching in the back, holding breath, using arms as a support too much.

Basic position: lying on the back, knees flexed, palms resting on the knees.

- when breathing out, pull the knees towards the chest, when breathing in, pull the knees off the chest, arms stretched.

Mistakes: backward lean of the head, insufficient breathing pattern.

Basic position: kneeling, stretched hands resting on an elevated surface (30-40cm), the back is straight.

- when breathing out, turn the trunk and feet lifted off the floor to the right, do the same to the left (look at the toes).

Mistakes: backward lean of the head, elevated hand support is too low, flexing arms, sagging in the lumbar area.

Basic position: kneeling, stretched hands resting on the floor, head is in the elongation of the trunk

- when breathing out, tighten the gluteal muscles gradually, rotate the pelvis so that the lumbar spine is lowered, press lumbar area towards the floor, then gradually arch the spine upwards all the way to the final phase when the head is bend forward, breathe in

- when breathing out, beginning with the head, the vertebrae one by one will gradually get back to the basic position

Mistakes: backward lean of the head, flexing arms, holding breath, motor irregularity

Strengthening abdominal muscles

Before strengthening the weak abdominal muscle groups, the antagonist muscle groups should be stretched first, as they are hypertonic in nature, and thus tend to be tight. This applies to the abdominal muscles in particular. In practice people usually start exercising abdominal muscles without stretching the muscles of the lumbar area and hip joint. That is incorrect. There is no point in strengthening the muscles without previous stretching of the lumbar and hip joint muscles. It should be noted that a tight muscle would disable the action of the opposing muscle. Even though you may feel the muscle is being strengthened, in fact its function is substituted by another muscle's action, which is referred as the substitution mechanism.

The desired effect of strengthening depends on the ability to engage the appropriate muscles. For abdominal muscles we may use an exercise testing the movement pattern in the trunk flexion:

The proper execution of the exercise, associated with the correct muscle activation is e.g. presented by gradual, round flexion of the trunk with legs stretched and active plantar flexion without undesired leg lifting. The movement continues until the pelvis starts tilting forward, engaging the low back muscles.

If the relaxation exercises were performed correctly as instructed and without mistakes, simultaneously, abdominal muscles were activated in some cases too. Subsequently we may proceed to the next exercise forms.

Also in this section, including practical examples of strengthening exercises, the same principles of the correct execution must be followed. That is proceeding from the simple towards more complex exercises, the number of repetitions should at first be 6-8, later 12-15. Regarding the above-mentioned facts, an excessive number of repetitions will activate other muscles, those that are hyperactive by nature. This will help complete the desired number of repetitions. However, the performance quality and the effect of the exercise will decrease.

Basic position: lying on the back, arms along the body
- when breathing out flex the heels (toes towards shins - plantar flexion), elevate the head, chin is pulled in the jugular hollow
- while breathing out, returning to SP, gradually, vertebrae one by one.
- Mistakes: head is not lifted gradually, chin is pointing up, backward lean of the head, rush return to the basic position, holding breath.

Basic position: lying on the back, legs are crossed at heels, stretched out and heels are slightly lifted off the floor, arms rest alongside the body.
- when breathing out – tighten your abdominal muscles, press the lumbar area against the floor, pull the legs slightly towards the trunk by using abdominal muscles only.
Mistakes: active legs, backward lean of the head, holding breath

Basic position: lying on the floor, hip and knee joints are both at 90° flexion, arms resting on the floor, stretched sideways
- when breathing out, rotate pelvis and recline the legs to the right, then to the left, do not place the legs on the floor.
Mistakes: backward lean of the head, holding breath, sagging the lumbar area

Basic position: lying on the back, knees bent, heels slightly lifted off the ground. Hold a tennis or volleyball ball in between your ankles
- when breathing out, roll the ball between your feet so that the legs are crossed, roll left and right
Mistakes: backward lean of the head, holding breath, flexing the legs

Basic position: back-support sitting position, back straight, feet on the floor, knees bent, a tennis ball held between the knees,

- when breathing out circle with your knees in front of the chin (chest), add putting legs to the right, left.
Mistakes: knees are not close enough to the chest, sagging in the lumbar area, holding breath, backward lean of the head

Basic position: sitting position, back straight, knees bent, feet on the floor arms stretched forward, clenched fists when breathing out – tilt pelvis and gradually lower to the position on the sacrum, head leaning forward, breathing out between legs, breathe in and clench your fists, every time you breathe out clench the fists again
Mistakes: irregular breathing, stiff sitting position (lumbar and thoracic vertebral column are not evenly arched), backward lean of the head, feet lifted off the floor, sagging in the lumbar area.