

LOWER BACK PAIN, A FREQUENT MEDICAL AFFECTION AMONG THE MILITARY. RECOMMENDED EXERCISES TO PREVENT, ALLEVIATE AND COMBAT IT

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Abstract: *After an introduction on the frequency of low back pain among the population, the first part of the article addresses issues related to the causes of this musculoskeletal disorder in the military, as a result of specific motor acts and actions. Given the causes of lower back pain and the fact that the lumbar muscles are at high risk for hypotrophy, the need to exercise and mobilize the muscles that support the spine is highlighted. Thus, given that the effects of back pain on the operational capacity of various military structures can be significant if no concrete action is taken in this regard, the second part of the paper presents a wide range of exercises, designed to especially for strengthening the muscles in the middle of the body, performed from three basic gymnastics positions (lying on the back, lying down facial, on the knees), which help prevent, alleviate and combat lower back pain. Based on the systematic evaluations performed over time for the treatment of acute, subacute and chronic lower back pain in which the specialists offered as exercises for recovery, i appreciate that it is necessary that specialists in the field of military physical education, in close cooperation with military doctors, to develop various clinical guidelines for the treatment and prevention of this condition. The physical exercises presented in this article are practically a useful guide for each military to design their own training program, obviously, after consulting specialists in the field.*

Keywords: *lower back pain; exercise; prevention; alleviation; combat; initial position.*

Introduction

Lower back pain or *lumbago*, according to the World Health Organization, is a common cause of work-related disability, being the most common musculoskeletal disorder in the adult population. Thus, it is said that at least 80% of the active population of the globe suffers, at least once in a lifetime, from an episode of lower back pain. In the military, a special professional category due to the specifics of their activity, it is regarded as one of the most common types of bodily pain. In this sense, in order to fulfill their missions, the military must discover the most modern and effective ways to alleviate and possibly combat pain. Thus, regular and continuous exercise, based on specialized recommendations, can be a great way to relieve lower back pain.

First of all, it is important to know that the lumbar spine consists of five vertebrae (L1-L5). The anatomy of the lumbar spine is represented by these strong vertebrae connected by capsules, ligaments, tendons and muscles, with extensive innervation. The entire spine is designed to be strong, as it must protect the spinal cord and the roots of the spinal nerves. At the same time, it is very flexible due to the joints between the vertebral bodies, offering mobility in different positions. The ligaments help to stabilize the joints during rest and movement, preventing injuries caused by hyperextension and hyperflexion. The lumbar spine is also governed by four functional muscle groups, divided into extensors, flexors, lateral flexors, and rotators.

1. Causes of lower back pain in the military

Where did the idea to write this article come from, given that today we have a multitude of sources of inspiration for the systematic practice of physical exercises of any kind? On the one hand, as a military man and specialist in military physical education, I have experienced such episodes of pain as a result of carrying out specific activities both personally and at the level

of my comrades, throughout my career being often put in the situation to answer questions about ways of alleviate lumbago. On the other hand, as a physical education teacher at the National Defense University "Carol I" since 2015 and until now, I may say that out of the dozens of study groups where I had the honor to teach, without exaggeration, I do not think that there was one that did not include at least one student who showed such pain during the study program, which determined their inability to achieve the objectives of the projected performance standards. Thus, with the publication of this article but also with the future activity that I will continue to carry out at the department, I hope to guide any soldier, and not only, in designing his own training program that will lead to preventing, alleviating and combating lower back pain.

Lower back pain is often the result of injuries such as muscle strains, damage to the intervertebral discs, joints and ligaments or nerves in the area. In addition, vertebral fractures, especially in individuals with osteoporosis, are a cause of lower back pain. Activities that can lead to back pain include lifting weights, sudden movements, lengthy standing, working on the computer for long periods, or sleeping in positions that do not keep the spine straight, and so on (Popescu 2021)

Military activities are characterized by a multitude of specific acts and actions that could go wrong (adopting an incorrect position when using weapon systems, military equipment and simulators; long jumps, high jumps, deep jumps and landing on hard surfaces; long marches on uneven terrain on foot or on skis; various climbs; crawling; throws; lifting and transporting equipment / materials; various staff activities; resting in non-compliant places in unfavorable weather conditions, etc.) and, obviously, the accumulation of stress in the spine.

Given these causes that can lead to lower back pain and the fact that the lumbar muscles are highly exposed to the risk of hypotrophy, it is absolutely necessary that the muscles that support the spine be exercised and mobilized voluntarily.

In this context, Dr. Jeffrey N. Katz, a professor of orthopedic surgery at Harvard Medical School, stated that *"an episode of acute lower back pain is a warning to people who do not move,"* and the occurrence of such pain can be *"a good opportunity to make a commitment to get moving when you start to feel a little better - usually in a few weeks"*. However, it is very important to understand that exercise does not remove back pain, but it can limit its frequency, and *"the risk of recurrence in the coming years would decrease,"* said Dr. Katz (xxx 2014)

2. Exercise to prevent, relieve and combat lower back pain

Lower back pain, especially if it is chronic, can seriously affect the quality of life of the person dealing with it. It is well known that sports or exercise can combat and prevent low back pain, but in the same way these activities can also trigger back pain, so choosing the most appropriate exercise is very important. Improper exercise can force a certain muscle group, causing a painful episode, which results in the impossibility to practice certain sports; these, together with improper exercise, are to be avoided by individuals suffering from lower back pain.

In the practice of the field of physical education and sports, more precisely in sub-domains such as school or professional physical education, physical therapy, medical gymnastics, etc., there are a number of exercises that can reduce the risk of lower back pain by strengthening the muscles that support the spine in the lumbar area. These exercises, performed regularly, are a significant way to increase the functional capacity of the whole body by preventing, alleviating and combating lower back pain.

Based on the systematic evaluations performed over time for the treatment of acute, subacute and chronic lower back pain which specialists have offered as exercises for recovery, it is imperative that specialists in the field of military physical education, in close cooperation with military doctors, develop various clinical guidelines for the treatment and prevention of this condition. This will lead to the fulfillment of the main objective of military physical education (maintaining soldiers' health) and, at the same time, to increasing the operational capacity of the armed forces.

In this context, based on my own experience in the field of physical education but also the abundance of sources from the literature, in the following lines I am going to present a sort of guide to physical exercises performed from three basic positions in gymnastics (lying on the back, lying face down, on the knees) and other initial positions derived therefrom.

2.1. Exercises in "the lying back" position:

- from the initial position *lying on your back, body perfectly stretched, heels on the floor*: simultaneous flexion and extension of the feet; 3-6 sets of 8-12 reps;

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor apart, arms outstretched sideways with palms on the floor*: alternating lowering of the knees on the floor inwards; holding the knee for 4 seconds with the inside on the floor, returning to the initial position; 3-6 sets of 8-12 reps with each leg;

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor apart, arms outstretched sideways with palms on the floor*: place the right foot over the left knee, then the left knee descends with the inside on the floor; ditto on the right; 3-6 sets of 8-12 reps with each leg;

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, knees side by side, arms outstretched sideways with palms on the floor*: lowering to the left of the knees, leaving the outside of the left knee on the floor; hold for 4 seconds then return to starting position; ditto on the right; 3-6 sets of 8-12 reps with each leg (**lower back rotational stretches**);

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, arms outstretched next to the body with palms on the floor*: with clenched fingers, grab the left leg below the knee joint and pull the knee to the chest to feel a slight extension of the lumbar area; hold the position for 15-20 seconds then return to initial position; 6-10 reps; ditto with the right leg; the same exercise is performed by pulling both knees to the chest at the same time; 3-6 sets (this exercise can also be performed by lifting the torso and bringing the chin to the knee) – **knee to chest stretch**;

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, arms outstretched next to the body with palms on the floor*: lifting the pelvis 2-4 cm by tightening the abdominal muscles and relaxing the gluteal muscles; hold the position for 1-2 seconds then return to initial position; perform 20-30 reps; 3-4 sets (**pelvic tilts**);

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, arms outstretched next to the body with palms on the floor*: lifting the pelvis by tightening the abdominal muscles until the thighs are in line with the torso; hold the position for 1-2 seconds then return to initial position; perform 20-30 reps; 3-4 sets (**bridging**);

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, arms outstretched next to the body with palms on the floor*: lift the left leg and pull the knee to the chest, then lower the knee to the left side and rotate the leg from the coxofemoral joint until the entire left leg becomes stretched; ditto on the right; 10-20 reps; 3-4 sets;

- from the initial position *lying on your back, legs bent at the knee joint, feet flat on the floor, arms bent with hands clasped at the nape of the neck*: slowly lift your head and

shoulders off the floor, tense your abdominal muscles, hold the position for 2-4 seconds, then return to the initial position; 8-12 reps; 3-6 sets (**partial crunches**);

- from *the supine position*, move to *the reverse plank position* (support on the soles and palms with the fingers facing forward, body raised so as to form a straight line from head to toe); hold the position for 30-60 seconds; 3-4 series.

2.2. Exercises in "the lying down facial" position:

- from the initial position *lying face down, arms outstretched in torso extension, palms on the floor*: lift the left arm and the right leg (both the arm and the leg are outstretched from the elbow, respectively the knee joint); ditto with the right arm and the left leg; 3-6 sets; 8-12 reps;

- from the initial position *lying face down, arms outstretched in torso extension, palms on the floor*: lift the arms and the feet (both arms and legs are stretched from the elbow, respectively the knee joint) and hold the position for 4-6 seconds; 3-6 sets; 8-12 reps (**superman exercise**);

- from the initial position *lying face down, legs perfectly stretched from the ankle and knee joints, forearms and palms on the floor with elbows below the shoulders joints, right neck and head up*: pushing in the forearms and palms, by contraction of the lumbar extensor muscles lift the head and area upper torso; hold the position for 10-12 seconds; 3-4 sets; 8-10 reps;

- from the initial position *lying face down, legs perfectly stretched from the ankles and the knees joints, arms bent with the palms on the floor on either side of the shoulders (cobra position)*: pushing in the palms, stretching the arms while lifting the torso in extension; hold the position for 20 seconds; 3-4 sets; 6-8 reps (**cobra exercise**);

- from the initial position *lying face down, the legs stretched perfectly from the ankles and knees joints, the arms bent with the hands folded together at the nape of the neck, the elbows sideways*: lifting the torso in extension and returning to the initial position; 3-4 sets; 8-12 reps;

- from the initial position *lying face down*: move to the plank position (support on tiptoe and forearms, elbows under the shoulders joints, head facing forward in the extension of the torso); keep the body for 30-60 seconds in a perfectly straight line between the heel and the shoulders; 3-4 sets (**plank exercise**);

- from the initial position *lying face down in support on the abdomen with arms and feet lifted outstretched forward respectively backward*: perform a simultaneous traction movement with the arms so that the elbows are next to the sides of the torso, then return to initial position; 3-6 sets; 8-12 reps.

2.3. Exercises in "on the knees" position:

- from the initial position *on the knees with the hands on the hips*: place the left foot with the sole on the floor so as to form a 90-degree angle between the leg-thigh and the thigh-torso, hold the position for 20 seconds; ditto with the right foot; 3-4 sets; 6-10 reps with each leg;

- from the initial position *on the knees with the hands on the hips*: bring the arms back to the torso with the hands on the soles, the pelvis forward so that the thighs are on the same line as the torso; hold the position for 20 seconds; 3-4 sets; 6-10 reps;

- from the initial position *on the knees*: lower the bottom on the heels while bending the torso forward and stretching the arms forward with the palms resting on the floor (**child position**); hold the position 20-30 seconds; 8-10 reps; from the same position the exercise can be performed by lifting one arm, 4-6 sets; 8-12 reps;

- from the initial position *on the knees sitting on the heels, hands on the floor with arms outstretched*: bend the torso and arms so that the forehead touches the knees; hold the position for 15-20 seconds; 8-10 reps;

- from the initial position *on the knees with the torso bent forward, arms outstretched in the extension of the torso and palms on the floor*: stretch the legs and place the feet on the floor on the soles; hold the position for 10-20 seconds; 4-6 reps;

- from the initial position *on the knees* place your palms on the floor so that a 90-degree angle is formed between the torso-arms, thighs-torso, thighs-legs and forearms-hands (***dog position***): lift and stretch a leg, and the opposite arm; 3-6 sets; 8-12 reps on each side; the exercise can be performed holding the position for about 20 seconds, and an alternative to it can be lifting the arm and leg on the same side;

- from the same position as in the previous exercise: lift the left arm and leg on the same side so that the left side of the body is stretched in a straight line; simultaneous left arm-leg extensions are performed; ditto on the right; 3-4 sets; 20-30 reps on each side;

- from the same position with the head straight so that the gaze is directed towards the floor: arch your back upwards while bending your head towards your chest, then lower your abdomen towards the floor without moving your shoulders at the same time as you lift your head towards the ceiling; 3-6 sets; 8-12 reps (***cat stretch***);

- from the same position: put the left hand to the nape of the neck, then the left elbow is lifted at the same time as the torso is twisted; ditto on the other side; 4-6 sets x 8-12 reps on each side;

- from the same position: move the left leg forward with the tibia on the floor, the foot extended on the floor, the abdomen on the thigh, the forearms resting on the floor; at the same time the right leg stretches perfectly on the floor back from the knee and ankle; hold the position for 15-20 seconds; ditto on the other side; 6-8 reps on each side.

In conclusion, what I presented above is a set of exercises that are performed from three gymnastics basic positions that can prevent, relieve or combat lower back pain. Certainly the exercises described must be adapted to each individual body and, where appropriate, to each individual condition, as the pain differs from person to person. Thus, it may take some time to find the right exercise program with effective means of action and an adequate dosage of effort (number of sets / repetitions).

Before creating your own exercise program, especially for combating back pain, it is absolutely necessary to consult specialists (doctor, physiotherapist, etc.) to obtain a postural assessment, to determine the posture deficiencies to be corrected, to perform functional movement tests (including details of the plans in which the exercises are to be performed), plus a nutrition and lifestyle analysis.

The most important thing to keep in mind when studying this article is that the dosages used above are indicative.

Conclusions

Lower back pain is one of the most common musculoskeletal symptoms among the population and especially among the military, due to the specific activities they perform. The effects of back pain on the operational capacity of different military structures can be significant if no concrete action is taken in this regard. Lower back pain should always be approached as a complex pathology in which the establishment of an accurate diagnosis of pain generators is mandatory before the start of any treatment, and therefore of an exercise program.

Exercise to strengthen the main muscles, around the torso, stomach, back and pelvis, is a good way to relieve and eliminate lower back pain, improving stability and balance.

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