

**BALANCE PROBLEMS AND ROLE OF MAGNESIUM SULFATE IN IMPROVING
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Balance is an even distribution of weight enabling someone or something to remain upright and steady. To keep equilibrium a person has to adjust between opposing or divergent influences or elements.

To be able to move, ambulate, and to be able to propel an individual forward or onward, this is done by means of a force that imparts motion. However, an individual with a locomotor disorder like e.g. Parkinson's disease that is characterized by a tendency to retropulsion, which is to walk backwards, has difficulties to accomplish this.

Center of Gravity

The center of gravity occurs in the body at a point where weight is equally distributed on all sides. Center of gravity can also be referred to as center of mass. From this point, a body can pivot in any direction and remain balanced. When standing evenly over one's center of gravity, one is in a state of equilibrium.

Where the center of gravity is located during locomotion is quite important so that the person in motion does not have calamities such as tripping, slipping and sliding causing them to fall which happens more often in the elderly. This can result in fractures and even spinal cord injuries.

Line of gravity

The line of gravity is an imaginary line that crosses through one's center of gravity dividing the mass of the body into two equal halves. This line changes depending on the body's weight distribution. It is a vertical line running from the top of the head, usually around the ear, down to the ground anterior to the sacral vertebra behind the hip joint, anterior to the knee and ankle. To keep one's body in balance, the posture must correspond with the person's line of gravity.

Base of Support

How wide the person spreads their feet determines the base of support and thus determines balance. The closer the center of gravity is to the ground, the more stability the person will have; the farther apart feet are placed, the steadier the person will feel. A good base of support

is needed when climbing and going up and down staircases and especially when moving or lifting heavy objects.

Gravity and the Body

Gravity affects many parts of the body as one ages. It compresses the spine, contributes to poor blood circulation and can decrease flexibility. The gravitational pull also affects internal organs, causing them to shift downward, away from their proper position. Gravity is often held responsible for the way excess weight accumulates around the midsection of the body.

The center of gravity moves during the sit-to-stand movements making these motions hazardous.^[1] Further studies need to be carried out on patients who have structural deformities of the spine or weakness in the lower limbs as seen in various diseases of the spine including hemiplegia, especially sit-to-stand.^[2] It has been shown that elderly people have difficulty standing on one leg for 10 seconds particularly standing on the non-dominant side making it more dangerous. Anyone with spinal deformities and the elderly when ascending or descending steps should perform step to maneuver, that is, ascend to the step above or below only after when they have both feet implanted on the desirous step.

Stair climbing is one of the most challenging tasks that is performed frequently. It is difficult to negotiate going up or down steps and this study showed some

additional spatiotemporal parameters during the stair case negotiation.^[3]

Figure 1., below, shows various spinal conditions all in the lateral view, ranging from normal to abnormal

conditions such as kyphosis, lordosis, flatback, and scoliosis. These disease conditions are treatable with physical therapy and there is only a very seldom need for spinal surgery.

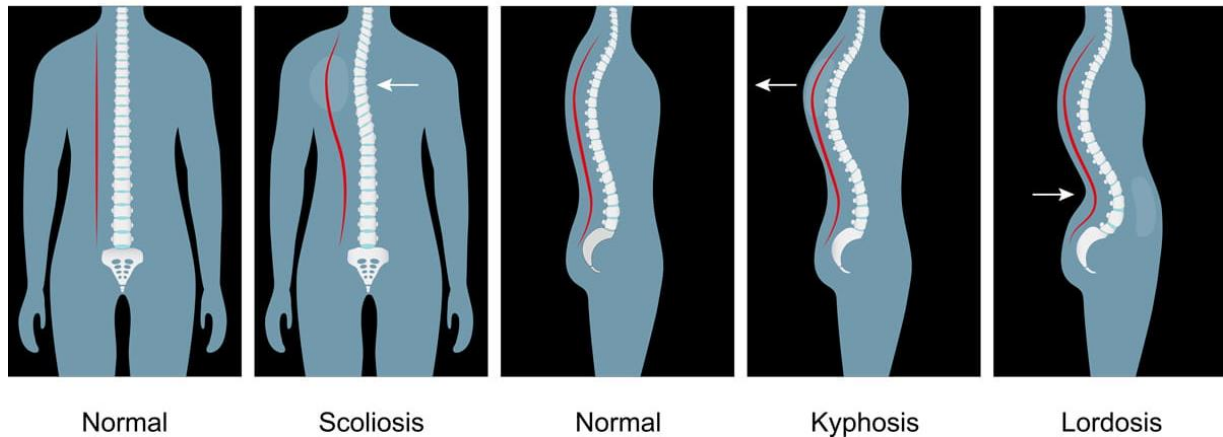


Figure 1: Different spinal abnormalities affecting the line of gravity.

During the gait cycle, clinical assessment for sagittal plane knee and hip joint kinematics, as well as some spatiotemporal variables including pelvis displacement and step characteristics were tested. This showed the importance of pelvic, knee and joint movements having influence on the gait cycle which becomes amplified in the situation of spinal and limb abnormalities.^[4]

In addition to fixed structural abnormalities, the size of the muscles determines their strength. There are four large and strong muscles namely trapezius, latissimus dorsi, gluteus maximus and adductor magnus. How the line of gravity passes through, makes these muscles tight or more difficult to relax well and unable to perform optimally and thus makes the joints more misaligned.

Since the line of gravity is very important, we support the muscle functions by making muscles as relaxed as feasible by using transdermal magnesium sulfate with the intention of making the especially huge muscles less shortened and tight. When muscles are relaxed, the joints can be more in alignment, improving the range of motion thus giving better function overall to perform daily activities. The usual daily activities of living (ADL) include sitting to standing, ambulation on inclines, stair climbing and social activities and ability to perform ADL leads to improvement in quality of life. When balance improves there will be less falls and less injuries and less chance of developing spinal and head injuries that can lead to dementia.^[5,6]

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