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Short Communication

Effect of Gravitational Torque Deficiency in Human Body

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Torque is the force which tend to rotate the body to which it is applied [1].

The object fixed on an axis will experience gravitational forces that will produce rotational forces (Torque). Gravitational torque is zero at center of mass in any object [2].

In human body also this applies the same where our bones and muscles act as a lever over the joint as axis. Our body is constantly exposed to these gravitational torque forces on all weight bearing joints. In which the gravitational force is creating a torque and pulling our body towards center of earth and our antigravity muscles produce a counter force to make our joints stable. Like any mass on earth in human body also gravitational torque is zero at center of gravity [3].

For example we will take knee joint. Center of gravity of knee joint is located on average 1.4 (+/-1.1) cm in front of the joint [4]. As the center of gravity of knee joint is placed anterior to knee joint it avoids the gravitational pull towards floor every time we stand up. But during certain activities where our center of gravity moves, like when we wear back pack or perform squatting, in which center of gravity on knee joint moves posteriorly it puts a great pressure on knee extensors to maintain balance [5].

In other words the gravitational torque need to be overcome by our antigravity muscles to maintain balance. In order to maintain strength in those muscles we need to expose them to gravitational torque force like performing full Asian squatting. But due to our sedentary lifestyle we are not exposing these muscles to enough gravitational torque. That creates weakness in those muscle fibers which is required in that particular range of motion. Which further causes inadequate tonic(stability) functions of these muscles that loads the joints and passive structures surrounds these joints during weight bearing activities [6]. Which in future causes lot of deformities and postural imbalances.

To avoid such we need to expose our joints and antigravity muscle to enough level of gravitational torque by engaging our self in functional exercises which includes full ROM of weight bearing joints [7]. By doing so we can maintain strength in antigravity muscles to overcome gravitational torque. When stability muscle are strong enough to maintain joint stability during weight bearing activities that reduces extra load in passive structures surround the joints and also reduces the load on mobility muscles. That can delay joint wear and tear.

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