

The importance of postural analysis in resistance training programs research pape...

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Posture analysis can be referred to as an evaluation of person's posture in search of signs of injuries, and poor habits of posture that can result in trauma in the future. In a set up of a clinic, such evaluations of a patient can be important for determination of the sources of postural strain as well as development of a suitable program of treatment. This technique may as well be applied for things such as assisting a person grow a more ergonomic workspace, right athletic shoes, and so on (Toronto Chiropracter, 2013).

There has been carried out an extensive study on human posture in order to learn more concerning in what way posture affects health. Neutral posture exerts the least damage on the joints, whereas postures such as being too stiff, slouching or canting joints out of position can lead to injuries with time. By use of posture analysis, people can search the sources of joints injuries, and they can find problematic posture, which can finally result in physical strain. Patients are given information on right posture and can be given workouts to do with the aim of enhancing posture. This may include physiatrics, and exercises at home, with periodical calls to find out whether the posture of the patient is safer and stronger. The strength as well as length of muscles that are involved in motion of the joint has to be balanced. This balance is on the basis of force couple principle amid muscles that are involved in the three motion cardinal planes. Once a force couple loses balance, the segment moves off its rotation axis, and there occurs faulty joint motion. The head, shoulders, trunk as well as pelvic girdle act as the bases, from which forces are directed to the limbs (Hignett, 1996).

Before carrying out any strength training program, it is important to do a postural analysis. Postural defects can be employed as a road map for keying

out alterations in length of ligament and muscle. This may take place when one group of muscles gets tight, and the antagonist lengthened. Joint synergistic muscles may be imbalanced and the agonists. Minor alignment defects in posture limit motion and result in muscles, as well as other soft tissues tightness. Elongated muscles often develop their maximum force in the stretched posture and are weak in the normal physiological position. Body segments alignment ought to be observed as the person stands still and in the course movements such as walking, to identify faulty patterns of joint mobility, as well as muscle activity. The better the movement quality and the better the gravitational forces' alignment through axes of joint, the better is the motion sequence (Allen, 2011). When alignment of posture improves, imbalances become minimal (Larry, 2012).

A postural analysis' systematic approach involves screening the anatomical alignment of the body relative to some established line of reference. This line of reference, gravity, helps in dividing the body into equal halves, front and back, and to cut it laterally. In preparation to execute postural analysis, the examiner ought to know about factors that will improve the success as well as the validity of the process of examination. These factors include minimal clothing of the subject being examined so as to ensure clear observation of contours as well as anatomical landmarks that are used for reference. The subject should be comfortable and relaxed. For those who use assistive or orthotic devices, analysis should be done with and without them in order to assess the effectiveness in posture correction. The subject's relevant medical history should be noted including any history that explains the current postural abnormalities, a total description of the current symptoms,

every previous treatment, among others (Marieb, 2004).

Postural analysis is usually carried out through assessment of the alignment of the body in posterior, lateral as well as anterior views while the patient is in a standing position. Lateral postural analysis ought to be carried out from the two sides in order to identify any rotational defects that may fail to be detected if viewed from only a single lateral perspective. Ideally, the plumb line ought to cross the ear lobe as well as shoulder joint. In the head and neck, the plumb line passed through the lobe of the ear to the acromion process. Usual defects include forward head where the head lies in the plumb line anterior. This may be because of excessive cervical lordosis, upper trapezius, right cervical extensor, and levator scapulae muscles. In the shoulder, the plumb line passes through the acromion process and common defects include forward shoulders in which the acromion process falls in the plumb line anterior and the scapulae are abducted. This can be caused by tight major and minor pectoralis, serratus anterior as well as intercostal muscles, forward head, excessive thoracic kyphosis, weakness of middle trapezius, thoracic extensor and rhomboid muscles.

This may also be due to lengthened lower and middle trapezius muscles. In the thoracic vertebrae, the plumb line bisects the chest in a symmetrical manner (Griegel-Morris, Larson, Mueller-Klaus, & Oatis, 1992). Common defects include kyphosis, which is raised posterior convexity of the vertebrae and this may result from anterior inter-vertebral disks compression, stretched thoracic extensors, lower and middle trapezius muscles as well as posterior ligaments. It may also result from tightness of anterior longitudinal ligament, anterior chest and upper abdominal muscles. In the lumbar

vertebrae, the plumb line falls in the middle of the abdomen and back and slightly at the sacroiliac joint's anterior. Common defects include lordosis, lumbar vertebrae hyperextension due to tilting of the anterior pelvic, posterior compression of vertebrae, stretched lower abdominal muscles and anterior longitudinal ligament, posterior longitudinal ligaments, lower back extensor and hip flexor muscles tightness (Riemann, DeMont, Ryu, & Lephart, 2001). Another defect is sway back, which is lumbar vertebrae flattening and may be caused by posterior pelvic tilt (Day, Smidt, & Lehmann, 1984), thoracic kyphosis, posterior compression of vertebrae, stretched anterior hip ligaments and stretched posterior longitudinal ligaments, hip flexors and back extensors.

In the pelvis and hip, the plumb line lies posterior to the hip joint and slightly anterior to the sacroiliac joint, through the greater trochanter, forming an extension moment. Common defects include tilt of the anterior pelvic where the anterior superior iliac spines fall anterior to the pubic symphysis. This may be caused by raised thoracic Kyphosis and lumbar Lordosis, posterior compression of vertebrae, stretched abdominal muscles, sacroiliac, sacrotuberous and sacro-spinous ligaments as well as hip flexors tightness.

Another defect is tilt of the posterior pelvic in which the symphysis pubis falls anterior to the anterior superior iliac spines and may result from sway back with thoracic kyphosis, anterior compression of vertebrae and hamstring muscles tightness.

In the knee, the plumb line passes slightly anterior to the knee midline, forming an extension moment. The common defects are genu recurvatum where the knee is hyper-extended, and the gravitational stresses fall far

forward of the joint axis. This may be caused by tightness of gastrocnemius, soleus and quadriceps muscles, stretched hamstring and popliteus muscles at the knee and compression forces anteriorly. The other defect is flexed knee likely resulting from hamstring muscles tightness, tight gastrocnemius muscles and stretched quadriceps, posterior compression forces, as well as bony and soft tissue limitations.

In the examination of a posterior view, the plumb line of the examiner bisects the body into equal halves, the left and right. In the head and neck, the midline divides the head through the external occipital protuberance. The head is normally placed squarely over the shoulders such that eyes remain level. The normal faults are head tilt. The head of the subject lies more to the plumb line's one side. This may result from lateral neck flexors tightness on one side, contra-lateral stretch of the lateral neck flexors and ipsi-lateral compression of vertebrae. Another defect is head rotated. The plumb line lies to the midline's right or left. This may result from tightness of the upper trapezius, sternocleidomastoid, intrinsic as well as scalene rotator muscles on one side. It could as well be as a result of contralateral rotator muscles elongation, rotation and compression of the vertebrae.

In the shoulder and scapula the plumb line, falls in the middle between shoulders. The common defects to look for include dropped shoulder where one shoulder lies lower than the other. This may be caused by hand dominance where the dominant shoulder is lower, shortness of the lateral trunk muscles and high and adducted hip as well as tightness of the latissimus dorsi and rhomboid muscles. Other defects include elevated shoulder, shoulder medial rotation, shoulder lateral rotation, adducted

scapulae, abducted scapulae and winging of the scapulae. In the trunk, the plumb line divides the thoracic and lumbar vertebrae's spinous process. The common defects include lateral deviation in which the vertebrae's spinous processes are lateral to the trunk's midline.

In the pelvis and hip, the plumb line cuts the gluteal cleft, and the posterior superior iliac spines are on a similar horizontal plane. The iliac crests, greater trochanters and gluteal folds are level. The normal faults include lateral pelvic tilt where one side of the pelvis is more than the other because of scoliosis with ipsilateral lumbar convexity, discrepancies of leg-length, contralateral quadratus lumborum shortening, tight ipsi-lateral hip abductor muscles on similar side as well as tight contralateral hip adductor muscles. Another normal fault is pelvic rotation in which the plumb line lies to the gluteal cleft right or left that may be caused by medial rotator and hip flexor muscles' tightness on the rotated side and ipsilateral lumbar rotation.

In the knee, the plumb line lies central between the knees. The common defects include genu varum in which the distal segment diverts toward the midline in relation to the thigh. The knee joint falls lateral to the lower limb's mechanical axis. This may be because of medial rotator muscles' tightness at the hip with knees that are hyper-extended, foot evor and quadriceps muscles, medial joint structures compression, retroversion of femoral, elongated lateral hip rotator muscles, popliteus and tibialis posterior. The common defects include genu Valgum in which the lower limbs' mechanical axis is laterally displaced due to the lateral knee joint and ilio-tibial band structures tightness, femoral ante-version, medial knee joint structures that are lengthened, lateral knee joint compression as well as foot pronation.

In the ankle and Foot, the plumb line lies equidistant from the malleoli. The common defects include pes planus in which there is reduced medial longitudinal arch, there is medial convex of Achilles tendon and the navicular bone's tuberosity lies below the Feiss line. This may be caused by elongated posterior tibial muscle, shortened peroneal muscles, stretched plantar calcaneo-navicular ligament, and structural displacement of the calcaneus, navicular and talus bones. Another defect is pes Cavus in which the medial longitudinal arch is high with the navicular bone lying above the line of Feiss. This may be because of shortened anterior and posterior tibial muscles, as well as elongated lateral and peroneal ligaments.

For the anterior analysis, the relationships can be assessed posturally from the anterior view with the plumb line cutting the body into equal halves, left and right. In the head and Neck, the plumb line cuts the head at the midline into two halves. The common defects include lateral tilt, rotation, and mandibular asymmetry where there lacks alignment of the upper and lower teeth, and there is a deviation of the mandible to one side. This may be as a result of stretched mastication muscles on the contralateral side, tightness of the mastication muscles on one side, malalignment of temporo-mandibular joints as well as teeth malalignment.

In shoulders, a vertical line cuts the xiphoid and sternum process. Common defects include dropped or elevated shoulder and clavicle and joint asymmetry. This may result from prominences secondary to joint trauma, dislocation or subluxation of acromio-clavicular or sterno-clavicular joints and clavicular fractures.

In the elbows, a line cuts the upper limbs and forms a 5° to 15° angle

laterally at the elbow when the elbow is extended. This is a normal angle that is known as the carrying angle. The common defects include cubitus valgus where there is a lateral deviation of the forearm from the arm at an angle greater than 15° for female and 10° for male. This may be as a result of hyperextension of elbow, trochlea distal displacement in relation to humerus' capitulum, ulnar collateral ligament stretching.

In the hip, the common defects include lateral rotation where the patellae angle is usually out. The likely causes of this are tightness of the gluteus maximus muscles and lateral rotators, medial rotator muscles' weakness, femoral retroversion and internal tibial torsion. The common defects include medial rotation in which the patellae face inward and may be caused by the ilio-tibial band and the medial rotator muscles tightness, lateral rotator muscles weakness, femoral ante-version as well as external tibial torsion.

In the knee, the legs lie at an equal distance from a vertical line running through the body. The common defects include external tibial torsion caused by tightness of the ilio-tibial band or tensor fasciae latae muscle, bony malalignment, tear of the cruciate ligament and femoral retroversion.

Another defect is the internal tibial torsion where the feet face directly inward or forward and is caused by tightness of the gracilis muscles and medial hamstring, tibia structural deformities, tear of the anterior cruciate ligament, femoral ante-version, pronation of foot, as well as genu valgus.

In the ankle and Foot, the common defects to look for include hallux valgus where there is a first digit lateral deviation at the metatarso-phalangeal joint. This may be as a result of first metatarsal head excessive medial bone growth, dislocation of joint, adductor hallucis muscle tightness, stretched

abductor hallucis muscle. The other defect is claw toes where there is a metatarso-phalangeal joint's hyperextension and proximal interphalangeal joints' flexion, related to pes cavus. This may be caused by long toe flexors' tightness, toe extensor muscles shortness.

While in a sitting posture, the hip and pelvis are observed. There an observation that the pelvis takes a posterior tilt with the posterior inferior iliac spines in a similar horizontal plane with the superior pubic ramus. The common defects include tilt of the posterior pelvic in which the superior pubic ramus appears to be superior to the posterior inferior iliac spines. This may be as a result of excessive flexing of the lumbar vertebrae, hamstring muscles tightness and low back extensors elongation. The other defect is the tilt of anterior pelvis in which the superior pubic ramus falls inferior to the posterior inferior iliac spine. This may be as a result of low back extensor muscles tightness, lengthened hip extensor muscles, as well as excessive lumbar lordosis (Miguel, et al., 2011).

The examination process a person that the capability to carry out an accurate and thorough postural analysis calls for a lot of skills on the part of the person being examined. The examiner ought to have the ability to separate the body parts from the whole and successively evaluate the sum of these parts, in acknowledgment to their complete anatomical structure interaction. In the right posture, the gravity line runs through all joints' axes, with the vertical alignment of the body segments. The line of gravity is represented by a vertical line running through the center of gravity of the body, situated at the second sacral vertebra. The line of gravity is an ever-changing line of reference, which reacts to the invariably changing position

of the body during upright posture (Gangnet, Pomero, Dumas, Skalli, & Vital, 2003). Even though the line of gravity does not normally run through every human body joint axis, people with excellent posture can come close to accomplishing that standard. Thus, the closer the postural alignment of a person lies to all joint axes center the less gravitational stress is put on the components of soft tissue of the supporting system.

In a case study, a client first visited a health center, concerned primarily on ameliorating her posture, strengthening of her lower back due to occasional pain at the lower back, as well as flattening her stomach. At the Postural analysis, it turned out clear that she had an experience of rotation in her spine caused her right shoulder to appear a bit higher than her left. The entire upper body seemed rounded and tight, which made her head to protrude (Darnell, 1983) offering a strained look. The examiner did not only work on her core strength, but also centered on opening and releasing the shoulders. Following just eight sessions, the alterations were turning apparent. The client begun with an over- kyphotic curve in her thoracic spine, but the entire ribcage was thrown forward leading to the forward head straining forming yet more neck tension.

Following the sessions, the head sat in a position that was comfortable exerting less strain on the back of the neck. The ribcage became more softened and relaxed, and the thoracic curve became less prominent. In the side view, the pelvis was tilted forward making the upper body to sway back so as to keep balance. Reposition of the pelvis brought the body into a lengthened and upright posture (Core Health Suite, 2013).

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