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Perspective: Fröhner's 1998 Posture Index for Lumbo-Pelvic Hip Complex

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A B S T R A C T

Objective: Lumbopelvic-hip complex enable to indicate force energy generation containing muscle proximal and distal end group connect abdomen and proximal low syndrome to losses of segment kinetic chain.
Methods and Materials: Rarely postural segment distortion collapses complex movement sporting events after loading stress, accordingly dynamic postural strategies reactivate spinal balance were invesitageted. Uncommon lumbopelvic hip complex evaluation is detect to young and adult individuals using Fröhner's posture index, according to specific complex syndrome provable review were examined.
Fındings: The mechanic syndrome have been explained on compartment complex to be imbalanced musculature and myofascial dystrophy. Fröhner's posture index was explained with this perspective.
Conclusion: A new approach to the evaluation of the lumbopelvic hip complex is postural medicine research.
Keywords: *Posture index, lumbopelvic hip complex, syndrome.*

1. Introduction

Exercise mobility dysfunction any tasks of lower body subsystems bring about improper compensation to high performance musculature so-called postural dysfunction (1). One of this postural dysfunction is lumbo-pelvic complex or lumbo-pelvic hip complex demonstrate in terms of muscle performance on complex lumbar spine syndrome of rotated movement (2). Over excessive bending flexion in terms of intrinsic muscle location caused simultaneously heavy strength load causing to improper muscle tone overall lumbopelvic fixed compartment (3). Spinal balance to enable longitudinal rectus femoris and gluteus maximus conduct is possible to perform prophylactive activities to avoid compesatory mechanism on postural posterior cone stability region economy (3, 4). Indeed, postural economy have been revealed compasention deformity to noncontact mechanism or abnormal pattern (5). In this without, repetitive contractions reduce the risk of back and lower back injury to gluteus maximus fascia latea into minimal effect of inserted iliotibial tract force generation influenced lower fixation dynamic (6). The

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multiple sacrotuberous thoracolumbar fascia support further load transfer observed on upper lower compartment pelvic region to detect excessively causes of tibia rotation based hip lateral motion, however internal rotation of fixed tibialis mostly occur muscle strain syndromes (7). To better understanding load transfer mechanic along lumbopelvic-hip complex connected to kinetic chain postural function investigate to proximal body segment and deep fascia (2, 3). Specific rotated body segments increase fascia tendon strain as part of spine contra rotated (8). In this condition, locomotive posture causes torsional musculature decreased hip strength and gluteus muscle activities as overactive increase, in contrast observed overactive hip adductor motion in dynamic load condition (8). Fascies tendon strain creates specific body segment location but may be more to asymmetry reported in spinal transver plane (7) This sort of strain therapy reduce to neuromuscular balance on muscle force generation of sport program not enough to lumbar region activation for strength and power condition (4). Lumbopelvic-hip complex concepts reduce force energy generation containing muscle proximal and distal end group connect abdomen and proximal low syndrome to losses of segment kinetic chain demonstated to alter back injury (1, 3). Approximately postural segment distortion collapses complex movement sporting events after load dynamic stress, accordingly dynamic postural strategy reactivated spinal balance (4). Usually that mechanic syndrome have been explained on compartment complex to be imbalanced musculature and myofascial dystrophy (8). Induced lumbar region caused forward flexion congenital of trunk have been explained overactivity syndrome (8). Indeed, faulty may pelvic spinal blocked position one main reason to severe postural deviation of overactive lumbar syndrome (9). This mechanism used on muscle volume to produce ultimately strength and power by horizontal lumbar position to preserve greater strain (9). Defined strain force generation of postural muscle torso causing proximal crossed toward trunk, however, progressive adaptation can be caused ineffective pelvic and hip dislocation (8). Structural integrity physiologic limit reduces postural segmental disrupture to highlighted contribution of lumbar deep musculature and decreased strength or imbalance during vertical lumbar flexion (3, 8, 9), The strengthen common muscular spinal alignment correlated to weakness of sacrotuberous ligament (10). Hence, lumbar lordosis view radiography radius technique and lumbar myofasiculus deep multifidus, lower longissimus, iliocostalis may imbalance localization of lumbopelvic region strain termed contraction mode of mechanic external force, compression and shear force (10). Applied lumbar region mechanical stress during increased compression force cause higher stress to intervertebral on degeneration of deep muscle (8). Muscle strength also is stability exercise of lower compartment force, but a component to generating pelvic, hip complex, lower back and abdomen (11). Understanding muscle function not three separate layers based on their low back, pelvic and hip explain kinetic chain transfer of lower extremity (3, 7). Strikingly, flexion movement concentric vs. eccentric transfers have been absorbed energy to essentially force generation. LPHC (Lumbopelvic-hip complex) instability considered mechanics of postural control, such method is using LPHC stability to force generation (11). Spinal instability may occur compressive external low stress possible explaining load to lumbar musculature associated with risk of injury of spinal load mechanism of low back movement estimated from complex modes of neuromuscular mechanics (3, 5). Lumbar musculature postural examination evaluationing spinal stability should be re-examined to postural syndrome including torso lateral subsystems into gluteus medias, tensor fascia latea, adductor complex and quadratus lumborum (8). Lumbar core center included in pelvic asymmetry, lordosis and low back pain imbalanced postural deformity (8). In this way, Fröhner's postural deviation strategy requested to determine on lumbopelvic hip complex. For this review only included random cohort Fröhner's posture index studies.

2. Methods and Materials

This study followed methodologic quality and bias of included independently random Fröhner's posture index research investigate applied lumbopelvic-hip complex science in databeses publication limitation to timed yearly retrospective cohort studies from September 2023. The Cochrane Collaboration quality controversies resolved one author eligibility reference to screen and evaluation completed eligibility criteria; a) subject property characteristics (ie; have lumbar dysfunction, syndrome, weakness), b) healthy and inhealthy status having to lumbar lordosis problem), c) Fröhner's postural examination having to subjects. Statistical resolution between pre and post comparison method, therefore mean and standart deviation operation systems randomize experimental condition to postural deviation.

Fröhner's posture index

Postural index describes general health condition creating inadvantage dysfunction. As Fröhner's angular distances of body segment conclude geometric angles termed postural indexes including body segment orientation (12). Posture index according Fröhner's angular distance of body segment including torso orientation explained to lumbopelvic-hip complex detection method has been characterized perpendicular inclination both lateral and tragus, sternum-thoracic spine and abdominal-lumbar spine distance obtained from horizontal plane; low, optimal and poor indexes. Postural index (PI) is vertical cord distance between sternum (a), lumbar lordosis (d), iliac crest (c) and thoracic kyphosis (b) references, high deviation lumbar lordosis throrax angle change direct indicates bending flexion angle (12). Postural index statements explain [(a+d/b+c)] between 1.0 and 1.3 postural balance references obtained horizontal deviation of lumbar muscle strain, torso inclination resulted from static load stress both cervical-lumbar head angular of distance unilateral flexion in sagittal configuration obtained to determine neuromuscular athrophic and postural weakness problems (13) (Figure 1).

Figure 1. Fröhner's Posture Index

Lateral posture detects LPHC high strain and forward bending stem from push and pull exercises according to unilateral and bilateral shoulder elevation, head and neck forward movement reason from dynamic dysfunction detection (8). As this condition, LPHC is one of lower crossed syndrome increases pelvic higher incline of cyclist, basketball, hockey and swimming players with seening lower waist height and complex overactive muscles; gastrocnemious, soleous, hip adductors, hip flexors complexed latissimus dorsi, erector spinae in contrast underactive muscles; anterior tibialis, posterior tibialis, gluteus maximus, medius, transver abdominis, internal oblique (8). PI values show flat back and upper body forward tilt; <1.0 and hyperlordosis of lumbar spine, anterio pelvic tilt; >1.3 in normal distribution (Table 1). The PI resolved on posture photographs in sagittal plane with marker (10-12 mm in diameter) on anatomical reference points require to standing posture looking straight ahead (12). Measurements primerly calibrated on the camera image in the horizontal plane (13).

Table 1. Posture index restriction

PI	Outcomes
Poorly index	0.8
Good index	0.9 – 1.0
Optimal balance index	1.0 – 1.3
Good index	1.3 – 1.5
Poorly index	1.5 – 1.7

3. Findings and Results

Fröhner's single approach may be developed on lumbopelvic hip complex detecting posture index limited researches. New evaluation posture index method used to postural research. Improper posture disabilities to detect posture index, risk of injury, selecting sport players have been recorded on proper posture analyzing. The PI also very good ICC=0.865 demonstrated on clinical investigation according to habituall posture of young and adult individuals (13). But in physiothreapist application measured basic and easly detecting lumbar lordosis and angle of trunk rotation as a results has been reported Fröhner' posture index was high ICC= >0.8 to majority upper body posture determination (14). In these results noted body inclination angle increases with age as well as PI unchanged on age groups and sexes. Strongly other researches supported PI determining on healthy and sport players (15) (Table 2).

Table 2. PI determination

Age	Sex	PI
6-8 y	W	1.15
9-11 y	W	1.13
12-14 y	W	1.14
15-17 y	W	1.12
6-8 y	M	1.20
9-11 y	M	1.11
12-14 y	M	1.10 -1.12
15 y	M	1.13 – 1.40
16 y	M	1.30 – 1.33
17 y	M	1.28
18 y	M	1.27
19 y	M	1.27 – 1.36
20 y	M	1.27 – 1.37
22-34 y	M	1.20

4. Discussion

The administred postural index outcomes declared reducing of risk of injury level and improper postural dysfunction (12, 13). The PI outcomes referred to postural disorders have been revealed on healthy and sport players (16). Poorly posture detected to limited ability according to Fröhner posture index (14). Over lesion, spine rotation and muscle overactivity increased on these abnormal postural patterns (14, 15). Postural defects can be reason lumbopelvic hip complex syndrome with lower body disabilities (3). In this case, Fröhner's posture index described trunk segment orientation to evaluation trunk stability (13, 15). The muscular displacement regulationing trunk segment based quality muscle performance resulting geometric change that forward incline of trunk body determined lower body overactive and underactive muscle integration to form kinetic chain of LPHC (8). Sagittal passive posture evaluation has been reported LPHC regulation to optimal posture outcomes reducing forward flexion of trunk body activated lumbar lordosis reduction (13). Contrastly, poorly posture suggested risk of injury reason to young compared to adults are back pain enable to quality postural control (15, 16). Posture regulation to determine targeted-orientation of trunk musculature of young and adults selected primerly posture improvement outcomes (16). Therefore, PI have been supported to internal validity measurement on young and adult individuals (16). Trunk muscle strength correlated to influenced lumbar lordosis risk factor is low back pain (3). Multiple postural deviations exclude to strength and strecthing unincluding improvement thoracic posture (4, 8). According to targeting LPHC transition activities maintained to subconscious body posture (2, 3). Postural low back pain defect can intervantion to achieve early postural medicine isolated forward tilt of pelvic by means of total trunk angle inclination (7). Modified trunk tools thus integrate posture index in terms of geometrical activity to acute low back pain detection and LPHC by means of pelvic forward tilt, forward and backward torso inclination on the sagittal plane (13).

5. Conclusion

Conformation give to repetative researches, this Fröhner's posture index only is one of LPHC syndrome detection. Specifically, postural abnormal musculature activity evaluation should be support to no pain and injury

and no gain. Brief reveal is that postural medicine activates in terms of easibility and usability with these researchers.

Authors' Contributions

Not applicable.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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