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Relationship between Common Foot and Ankle Abnormalities and Low Back Pain: An Observational Study

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Abstract:

Objectives*: The aim of the study is to investigate or identify association of low back pain with some common foot and ankle deformities. (Pes planus, pes cavus, Calf muscle tightness & hallux valgus and varus, inversion and eversion of fore foot by goniometric measurement at neutral position).*

Methods: *The subjects of both genders between the age of 20-60 years were selected on the basis of inclusion & exclusion criteria for the study. An Oswestry Scale low back pain disability questionnaire was used for the back pain patients. Similarly another scale i.e. Manchester foot pain and disability index was used to asses foot and ankle problems. Once when all the information collected regarding to low back pain and ankle and foot problems all the tests were applied. Navicular Drop test, Heel rise test, Coleman Block Test for -pes planus, calf muscle tightness, pes cavus respectively, Goniometric measurement were done for Hallux valgus & varus, inversion & eversion of forefoot at neutral position to see deviations.*

Results: *Based on the results of our study, the low back pain has a correlation with some common foot and ankle abnormalities.*

Conclusion: *Low back pain has a correlation with the abnormalities of foot, especially with the pronated feet, fallen arches of feet, forefoot eversion and posterior tibial tendon dysfunction or calf muscle tightness. There was no correlation with position of the Hallux*

and inversion of forefoot. Hence these tests may be incorporated in the assessment of low back pain in order to gain a better understanding of the true nature of the pathology and provide a more holistic treatment to the patients.

Key words: Low back pain, Foot and ankle abnormalities

INTRODUCTION:

Pain in the lower back or low back pain is a common concern, affecting up to 90% of people at some point in their lifetime.1 The term low back pain (LBP) for the first time was applied by Anderson as a pain which was limited to the area between the lower edge of the ribs 12 and gluteal folds.2

The low back pain develop insidiously, progressing from mild in early life to debilitating in later life 3 and it accounts for approximately 15% of the sick leave, and is the most common cause of disability in persons less than 45 years of age.1 and it is associated with widespread physical, social, psychological & economic effects & consequences in life. 2 In up to 85% of people with low back pain, despite a thorough medical examination, no specific cause of the pain can be identified.1 Some studies demonstrated that distortion and deformity of the foot and ankle due to impairment in the lower limb kinematic chain can be considered as one of the possible causes of LBP.2

The foot is an important element for the body structure; changes in the feet can be responsible for causing postural imbalance. Approximately 80% of the general population has alterations in the feet.4 Although, it seems that waist and legs are separated from each other, but based on biomechanical principles and rules concerning the kinematic chain, it appears that they are effective on each other and probably any change in the normal functioning of the area can also affect other areas.2

Several studies have surveyed the relationship between flatfoot and low back pain and different and sometimes contradictory results were obtained.2

It is extremely important, in the evaluation of low back pain, to also analyze the foot .As the feet are important element for body structure, particularly for the postural system, so it is vitally important to analyze relationship of low back pain with foot & ankle.4

The literature points that foot and ankle deformities can correlate with low back pain. But it is not clearly defined. So further research is need to done on this concept.

METHODS:

100 subjects of both genders between the age of 20-60 years were selected on the basis of inclusion & exclusion criteria for the study. An Oswestry Scale low back pain disability questionnaire was used for the back pain patients and all the questions included in the questionnaire were asked to the patient to collect information regarding the low back pain. Similarly another scale ie Manchester foot pain and disability index was used to asses foot and ankle problems.

Once when all the information collected regarding to low back pain and ankle and foot problems all the tests was applied. Navicular Drop test, Heel rise test, Coleman Block Test for -pes planus, posterior tibial tendon dysfunction or calf muscle tightness, pes cavus respectively ,Goniometric measurement for Hallux valgus & varus, inversion & eversion of forefoot at neutral position to see deviations.

NAVICULAR DROP TEST: Firstly the Navicular drop test was applied; the subjects were placed in a sitting position with their feet flat on a firm surface & knees flexed to 90 degree ankle joint in neutral position. After that the most prominent point of the Navicular tubercle was identified and marked with

the pen. Index card was placed on the inner aspect of the hind foot, from the floor in a vertical position passing the Navicular bone and the level of the most prominent point of the Navicular tubercle was marked on the card. Then subjects was asked to stand without changing the position of the feet & to distribute equal weight on both feet .In the standing position, the moist prominent point of the Navicular tubercle was again identified and marked on the card. Finally the difference between the original height of the Navicular in sitting position & weight bearing position was assessed with a measuring scale or vernier calliper rendering the Navicular drop in millimetres.

HEEL RISE TEST: Single heel rise test was used to check integrity of posterior tibial tendon or calf muscle tightness. Subjects were asked to touch their fingers to the wall at shoulder level to help them keep their balance. Heel-rises were performed at 10 beats per bar, 1 clicks per beat & at 50% BPM & performed at the beat of metronome. The metronome is used in maintaining a consistent rhythm of heel raises for each subject. The subjects were asked to lift the contralateral foot so that the planter flexors being tested stimulate single limb support, the epsilateral knee is fully extended and the heel is lifted off the floor through maximum planter flexion range. Before the test the subjects were instructed to stand straight and to rise & lower the balls of their feet in rhythm with the metronome.

COLEMAN BLOCK TEST: After peek-a-boo-heel sign Coleman block test was used to assess medial longitudinal arch and heel varus (heel varus is more likely to develop in the pes cavus). The subjects was asked to stand on the 1-2 inches wooden block placed on the floor with the heel and the lateral edge of the fore foot (5th metatarsal) on the block with the medial forefoot (1st metatarsal) off `the block. After that heel examination was done to identify normal and abnormal

responses. In normal response – If the heel corrects to neutral position the hind foot is mobile, and the deformity seen clinically was due to planterflection of the 1st metatarsal. In abnormal response –If the hind foot remains in varus there is fixed hind foot inversion deformity.

MEASUREMENT OF INVERSION AND EVERSION OF FOREFOOT AT NEUTRAL POSITION:-

INVERSION:

Position of subject: Long sitting and the legs was kept hanging.

Axis: Medial joint line of the head of the Ist metatarsal was taken as the axis and the movable arm and the stable arm was kept at 90 degrees.

Stable arm: stable arm was placed parallel to the medial aspect of the ankle and lower leg.

Movable arm: It was placed over dorsal aspect of the foot , perpendicular to the stable arm.

HOLDING

Right hand was used to hold the stable arm, left hand was used to hold movable arm with the dorsal aspect of the foot & measuring the angle at neutral position.

EVERSION

Position of the subject: Long sitting and the legs was kept hanging.

Axis: Lateral aspect of the head of the 5th metatarsal was taken as the axis and the movable arm and the stable arm was kept at 90 degrees.

Stable arm: Stable arm was placed parallel to the lateral aspect of the lower leg.

Movable arm: It was placed over dorsal aspect of the foot perpendicular to the stable arm.

HOLDING

Right hand was used to hold the stable arm, left hand was used to hold the movable arm with the dorsal aspect of the foot and measuring the angle at neutral.

HALLUX VALGUS AND VARUS DEVIATIONS OF THE FOOT:-

Position the subject was supine or sitting, with the foot in 0 degrees of inversion and eversion. The MTP and IP Joints was positioned in 0 degrees of flexion and extension.

GONIOMETER ALIGNMENT

- The Centre the fulcrum of the Goniometer was placed over the dorsal aspect of the MTP Joint.
- After that Alignment of the proximal arm with the dorsal midline of the metatarsal was done .Alignment of the distal arm with the dorsal midline of the proximal phalanx.
- The right hand was used to maintain alignment of the proximal Goniometer arm.
- Left hand was used maintain alignment of the distal Goniometer arm while maintaining the MTP in abduction.14,15,16

DISCUSSION:

Treatment of low back pain presents a considerable challenge, as a specific path anatomical diagnosis cannot be identified in

85% of cases. Well-established risk factors, postural variations, such as decreased lumbar lordosis and leg length inequality have long been suspected to play a role in predisposition to low back pain by altering the stresses placed on soft tissue structures around the Spine.5Abnormal foot posture and function or abnormalities have been implicated with some studies and having established flat feet and pronated feet as a risk factor for low back pain, but there are also some studies that obtained different results and reject this relationship.

J.W Brantingham et al concluded that flat feet did not appear to be a risk factor in subjects with mechanical low back pain and further research is needed. Menz et all in Framingham study found that foot posture that is flat foot or cavus foot is not associated with low back pain. A study by Farzad et all included only men and concluded that flat foot and increase longitudinal arch of the foot can be a cause of chronic back pain.2

Our study includes both the genders. The results of our study are in agreement since our study demonstrated significant corelation between Oswestry scale and Manchester foot disability index as well as heel raise test. This study demonstrated a positive correlation of low back pain with Navicular drop test, which suggest that low back pain is associated with flatfeet. Our study suggest that calf muscle tightness is also a possible cause of low back pain, by a mechanism that because of tightness in the calf muscle, ankle range of motion become limited and the centre of mass shifts anteriorly.This causes the thoracolumbar par spinal muscles to over work while trying to maintain an erect posture, this leads to an increase in lumbar lordosis. Since there is restriction in full ankle dorsiflexion and knee flexion, the joints in the foot are forced to flatten in order to compensate for the reduced ankle range of motion. Increased longitudinal foot arch has been established by many studies as being related to low back pain.4 but our study showed mild correlation of this foot type

with low back pain may because of limitation that We had included Coleman block test in our procedure to determine the relative position of the hind foot for cavus foot but since it does not have numerical results we were unable to determine its correlation with Oswestry scale. Our results are in line with previous literature as we have also demonstrated a correlation between Eversion and low back pain. Our study does not include data during ambulation and the established results that excessive foot pronation rather than supination is associated with low back pain may explain why we did not observe any correlation between Oswestry scale and Hallux valgus measurements as well as inversion. We are also unable to explain the unilateral lack of correlation (rt) between Oswestry scale and Navicular drop test and eversion, which may partly be attributed to limb preference and laterality, due to which some degree of asymmetry is a normal feature of gait, with the preferred limb providing greater propulsion and the non-preferred limb providing greater support.

CONCLUSION:

Based on the results of our study we can conclude that low back pain has a correlation with the abnormalities of foot ,especially with the pronated feet, fallen arches of feet, forefoot eversion and posterior tibial tendon dysfunction or calf muscle tightness. There was no correlation with position of the Hallux and inversion of forefoot.

REFERENCES

1. R.K Arya; Low Back Pain –Sign, Symptom and Management; Indian academy of clinical medicine.2014,vol 15:30-41.

2. Farzad Amoozadeh Gholamhossein Kazemian et al;Surveying the relationship between flatfoot and chronic mechanical low back pain: Indian Journal of Fundamental and Applied Life Sciences. 2015, vol 5:79-83.
3. Brian A Rothbart et al;Preliminary findings:American journal of pain management.1995,vol 5 no.3:84-90.
4. Cláudia dos Santos Borges et al;Relationship between lumbar changes and modification in the planter arch in women with low back pain: Acta Ortop Bras.2013, 21(3):135-8.
5. Hylton B. Menz, Alyssa B. Dufour et al ; Foot posture,foot function and low back pain: The Framingham foot study:Rheumatology oxford journals.org.2013:52:2275-2282.
6. Jody L;Measures of Foot Function, Foot Health, and Foot Pain: American College of Rheumatology. 2011, Vol. 63:S229-S239.
7. Misterska E ,Jankowski R et.al; Quebec back pain disability scale low back outcome score and revised oswestry low back pain disability scale for patient with low back pain due to degenerative disc disease evaluation of polish versions .
8. Umesh Adhikari et.al; Normative values of navicular drop test and the effect of demographic parameters: a cross sectional study:Annals of biological research scholar research, 2014,5(7):40-48.
9. Renata Vauhnic et al;Intra- rater reliability of using the Navicular drop test for measuring foot pronation: Hrvat.Sportskomed.Vjesen, 2006,21:8-11.
10. Brenda Rae Lunsford, Jacquelin Perry; The Standing Heel-Rise Test for Ankle Plantar Flexion: Criterion for Normal: Physical Therapy .1995,Vol 75, No.8:694/49-698/53.
11. Michael D. Ross and Elizabeth G Fontenot et al;Test-retest reliability of the standing heel-rise test. J Sport Rehabil.2000,9:117-123.
12. Arthur Manoli, Brian Grahamet et al; The Subtle Cavus Foot, "the Underpronator," a Review: Foot & Ankle International. 2005,Vol. 26,No3:256-263.

13. Kim JY, Keun Hwang S, Tai Lee K, Won Young K, Seon Jung J; A simpler device for measuring the mobility of the first ray of the foot:Foot and Ankle International.2008,29(2):213-8.
14. Cynthia C Norkin.Measurement of joint motion : A guide to goniometry, chapter 6 page 174-175.
15. S Lakshminarayan ;The Textbook Of Therapeutic Exercises. chapter 4,p-50.
16. Robert A. Et al; Goniometric Reliability in a Clinical Setting Subtalar and Ankle Joint Measurements:Physical therapy.1988,vol 68 No.5:672-677.
17. Seda Bicici,Nihan Karatas,Gul Baltaci;Effect of atheletic taping and kinesiotaping on measurement of functional performance in basketball players with chronic inversion ankle sprain:The international jouranal of sports physical therapy.2012 vol-7 no.2:154-166.
18. Orthopaedic one article (30) Hallux valgus p-171-372.
19. James W. Brantingham et al; A single blind pilot study to determine risk and association between Navicular drop, calcaneal eversion and LBA:journal of manipulative and physiological therapeutics, 2007,vol-30,no.5p-380-381.
20. Julie Kohls Gatzoulis;Tibialis dysfunction a common and treatable cause of adult acquired flat foot: BJM. 2004 vol 329 p-1328-1333.
21. Kosashvili Y, Fridman T; The correlation between pes planus and anterior knee or intermittent low back pain: Foot Ankle Int. 2008,29(9):910-3.
22. George E. Ehrlich;low back pain:Bulletin of the World Health Organization 2003, 8(9).
23. Michael T Cibulka; Low Back Pain and Its Relation to the Hip and Foot: Journal of Orthopaedic & Sports Physical Therapy 1999;29(10) :595-601.
24. Karl Canseco et al; Multisegmental Foot and Ankle Motion Analysis After Hallux Valgus Surgery: Foot Ankle Int. 2012, 33(2): 141–147.

25. Vivienne Chuter; The effectiveness of shoe insoles for the prevention and treatment of low back pain: asystematic review and meta-analysis of randomised controlled trials :BMC Musculoskeletal Disorders. 2014,15:140.