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Correlation of Mechanical Low Back Pain and Foot Alignment In Adults.

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ABSTRACT

Low back pain alters the posture and walking pattern to get relive from pain while working. Continuous alteration may lead to the permanent changes in the posture. Lower limb is most commonly affected due to the weight bearing. Objective: objective of the study was to assess the foot using alignment foot posture and foot print analysis in mechanical low back pain people and correlate them. Method: Oswestry low back pain index was use to assess the degree of disability. Foot posture index and foot print analysis (clarke's angle, chippaux-smairak index, and staheliindex)used to assess the foot alignment. Analysis was done using spearman's correlation.

Result : No correlation was seen between mechanical low back pain and foot posture index (rt foot r= -0.081,lt foot r=-0.085), also no correlation was seen between mechanical low back pain and clarke's angle (rt foot r= 0.158,lt foot r= 0.112), No correlation was seen between mechanical low back pain and staheli index (rt foot r= - 0.064,lt foot r= 0.004) a weak negative correlation was seen in Chippaux- Smairk Index (r= -0.218, r=-0.189)

Conclusion: The study shows that there is no correlation of mechanical low back pain and foot posture index, Clarkes Angle and Staheli Index but a weak negative correlation was seen with Chippaux-Smairk Index.

KEYWORDS: low back pain, foot posture index, foot print analysis.

INTRODUCTION:

Back pain is one of the great human afflictions.[1]Low back pain affects people of all ages, from children to the elderly, and is a very frequent reason for medical consultations. The 2010 Global Burden of Disease Study estimated that low back pain is among the top 10 diseases and injuries that account for the highest number of disability-adjusted life years worldwide.[2] Low back pain (LBP) is defined as pain and / or discomfort located below the costal margin and above the inferior gluteus folds, with or without related leg pain.[3] Mechanical low back pain is common medical problem. Mechanical means the pain may be in the spinal joints, discs, vertebrae, or soft tissue. Approximately 70–85% of individuals will experience LBP during their lifetime, and over 80% of them will report recurrent episodes. It is estimated that 80–90% of subjects would recover within 6 weeks, regardless of the type of treatment; however, 5–15% will develop chronic LBP [3]. Low back pain has a relevant impact on patients in terms of pain, activity limitations, participation restrictions, influence on career, use of sanitary resources, and financial burdens [2,3]. Low back pain is the leading cause of activity limitation and work absence throughout much of the world, imposing a high economic burden on individuals, families, communities, industry, and governments.[4,5]

Alignment refers to the way axes of the bones line up. Correct alignment is essential for avoiding damaging pressure on the weaker parts of the joints and shear stress on the ligaments, lowering susceptibility to sudden injury.[6]

The foot is a structure whose functions are plantar pressure distribution, support, balance, impulse, impact absorption, weight bearing and adjustment of posture in the upright position. As it performs an essential role in posture, it can be responsible for causing postural imbalances, and also adjust to the imbalances

originating from structures overlying the feet.[7]Thus complaints of pain in the lumbar spine can arise from changes in the plantar arch, either its decrease or increase.[7,8]

When feet are mal-aligned, it leads to a chain reaction of misalignment in the body, affecting the knees hips and back, often resulting in pain when standing, walking, and running. Misaligned feet can lead to variety of symptoms including, flat feet, foot pain, back pain, knee pain hip pain bunions and hammertoe. Relationship between the lower extremity and low back pain often assume a little research has been published to association there are many like Innes who believe that it is essential to examine the lower extremity in case of low back pain.[9]

Rothbart and Estabrook found a high co-relation between excessive pronation and low back pain. Their study was done on only low back pain patients they found 96% were excessive pronators (pronating more than 60 during the stance phase of gait)[10]. Hence the aim of the study was to correlate mechanical low back pain and foot alignment.

Objective of the study was to assess the degree of disability of low back pain and foot alignment using foot posture index and foot print analysis. Therefore the objective of this study was to explore the relationships between foot postures, and to see the relation between the forefoot, mid foot and rare using foot print analysis. With mechanical low back pain in men and women who participated in study.

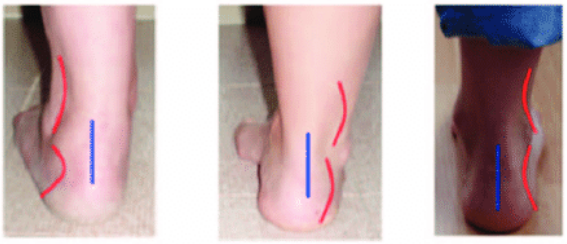
METHOD AND METHODOLOGY:

An observational study was done on people with low back pain. One hundred twenty low back pain people of age group of 20-45 were given questionnaire and were assessed for foot alignment. Those who have pathological low back pain, those who are under went any spinal and lower limb surgery, low back pain due any surgery and any diagnosed deformity of lower limb were excluded. The purpose and procedure were explained to the participants and a written consent was taken. Each participant was made to fill the Oswestry low back pain questionnaire[11, 12]. The participant who had Oswestry score 0-60% were further assessed for foot alignment.

1. Foot posture index -6 (FPI-6)[13,14,15]

   The FPI-6 was assessed in weight bearing posture. Observations were made with the participants standing in comfortable double limb support static stance position. Then foot posture was assessed by using six criteria. The criteria were - Talar head position, Supra infra malleolar curvature,Inversion/ eversion of calcaneus, Bulging of talonavicular joint, Congruance of the medial longitudinal arch, Adduction/ abduction of the forefoot on the rarefoot.

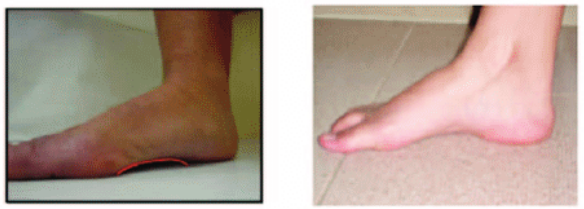
FPI 1. Talar head palpation



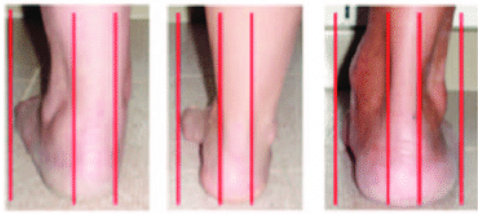
FPI 2. Supra and infra lateral malleolar curvature

FPI 3. Calcaneal inversion/eversion

FPI 4: Prominence of the Talo Navicular Joint



FPI 5. Congruence of the internal longitudinal arch



FPI 6. abduction/adduction of the forefoot with respect to the rear foot

2. Foot print analysis

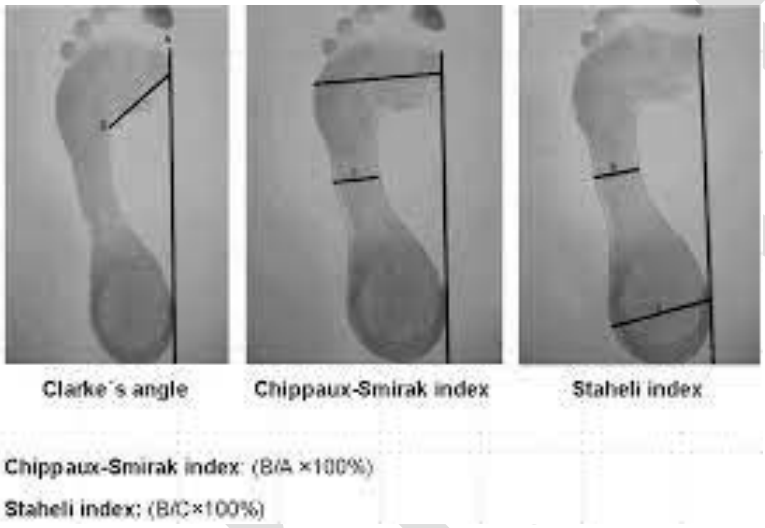
It was done using Harris mat. Participants were told to walk on the mat and foot prints were taken. The three indexes were assessed on foot print analysis by using scale and protractor.

The indexes are

a. Clarkes angle / index[16]: It helps to measure internal longitudinal arch. Angle between, line A, that joins the more internal point of the forefoot and the more internal point of the rarefoot, with line B, that joins the more internal point of the forefoot with the deeper part of the foot print.

b. Chippauxsmairak index[17]: It helps to measures the area of the midfoot on a smooth surface. It measured by dividing the value of narrower zone of the mid foot (B) by the value of the narrower zone of the forefoot (A), and multiplying by 100. Chippaux – smiraks index = B/A *100

c. Staheli index[18]: It measured by dividing the value of narrower zone of the mid foot (B) by the value of the narrower zone of the hindfoot (c), and multiplying by 100. Chippaux – smiraks index = B/C *100

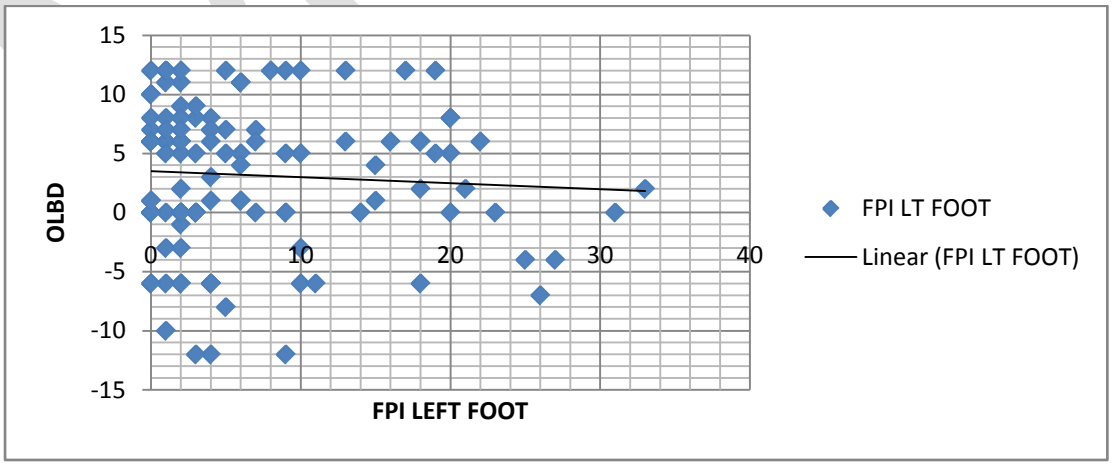


RESULT:

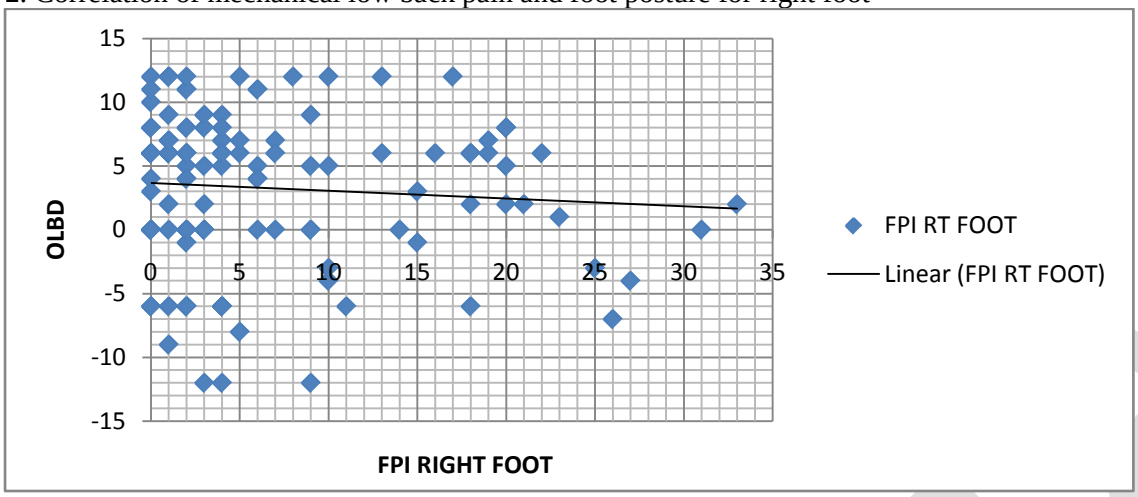
The data was analyzed using Spearman's correlation. Correlation of mechanical low back pain and foot posture index was found. Correlation of mechanical low back pain and foot print analysis was found.

Graphs

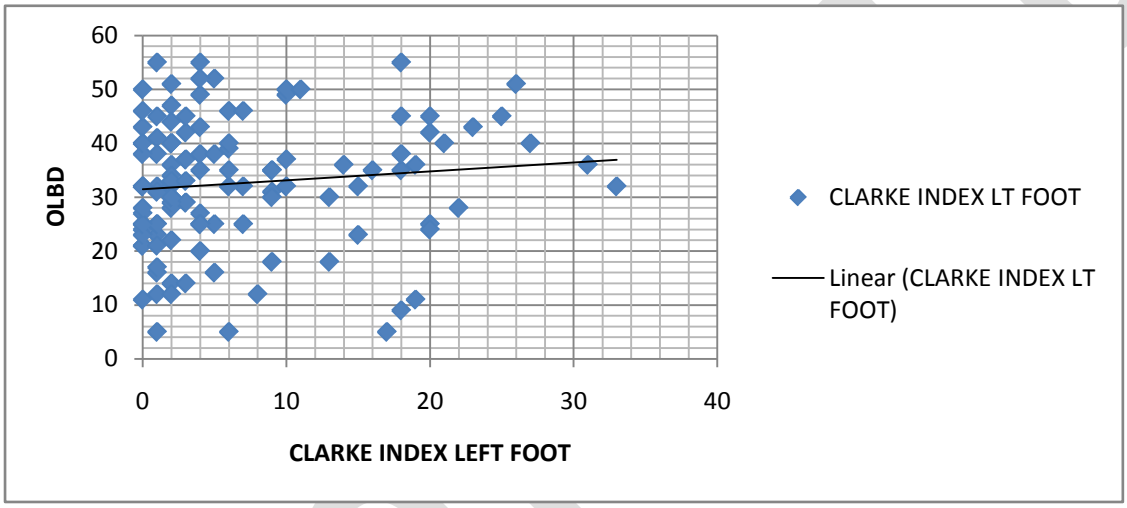
1. Correlation of mechanical low back pain and foot posture for left foot



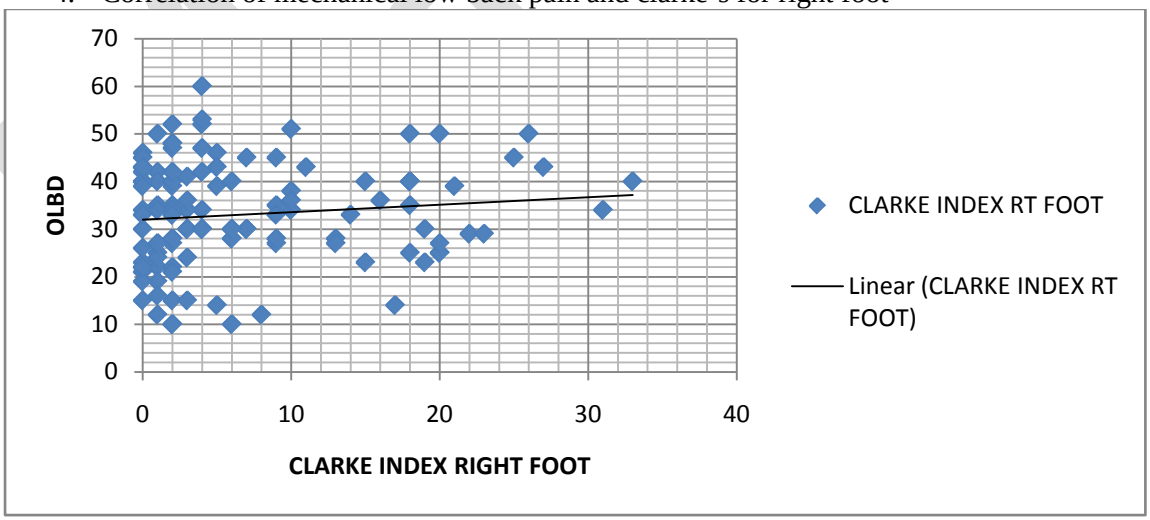
2. Correlation of mechanical low back pain and foot posture for right foot



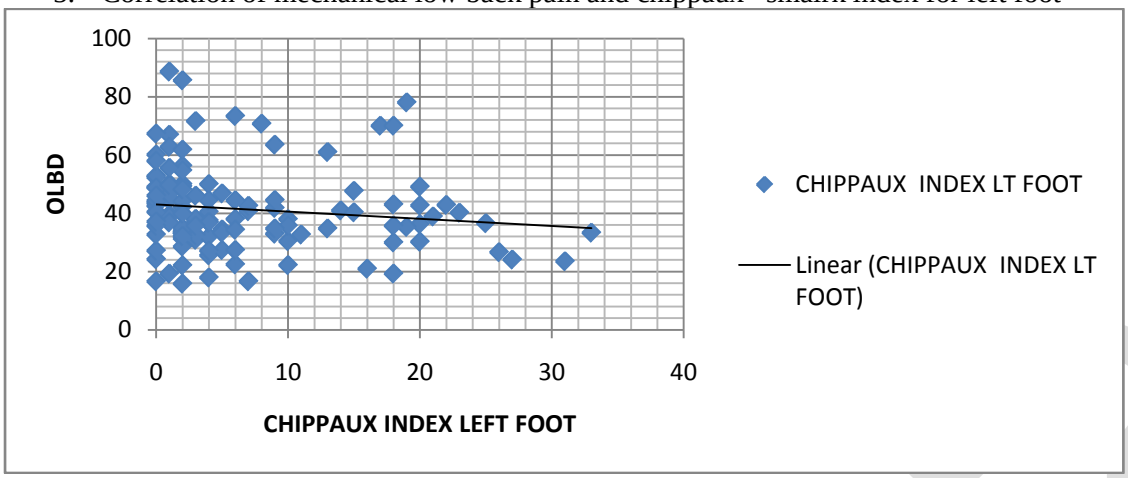
3. Correlation of mechanical low back pain and clarke's for left foot .



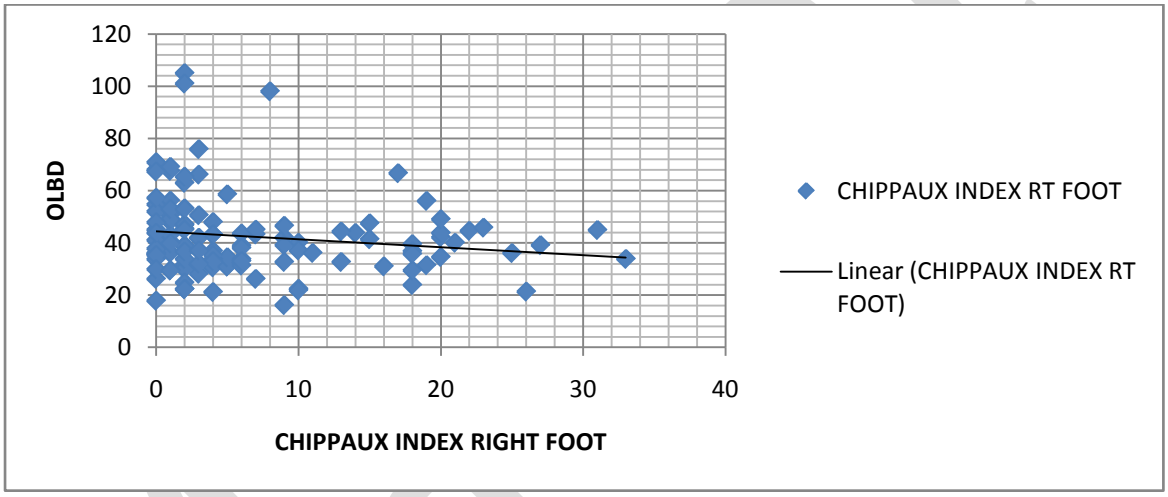
4. Correlation of mechanical low back pain and clarke's for right foot



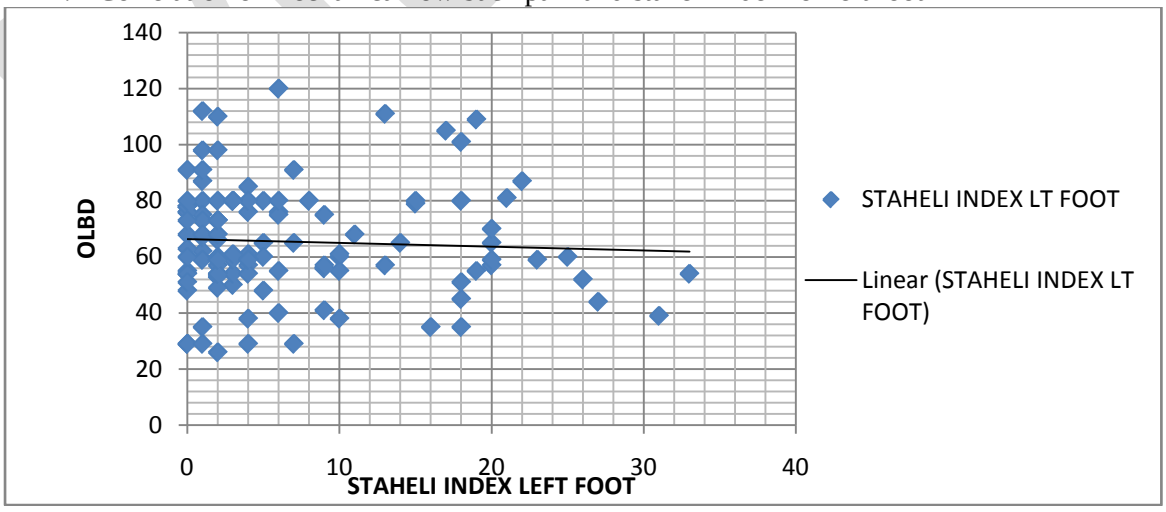
5. Correlation of mechanical low back pain and chippaux –smairk index for left foot



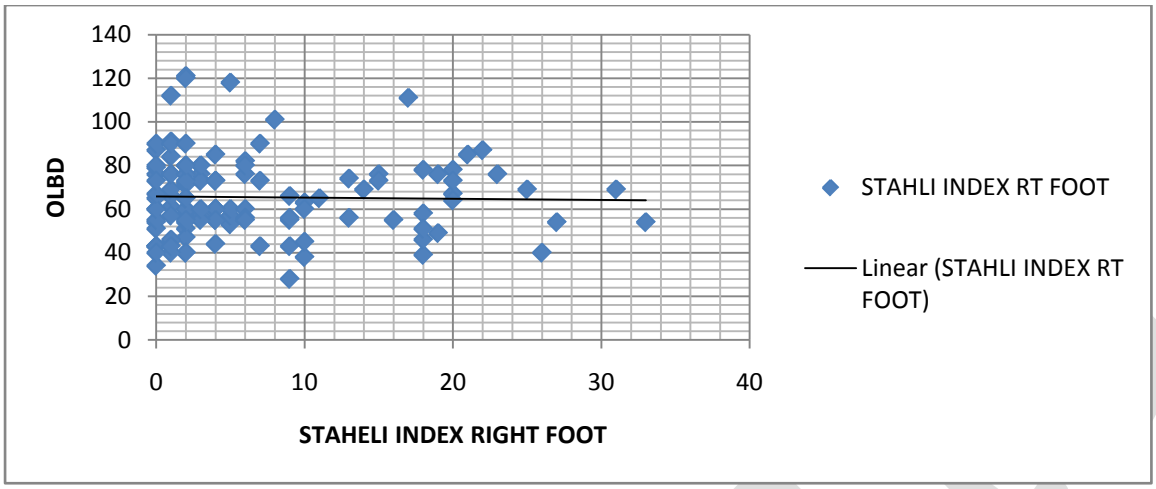
6. Correlation of mechanical low back pain and chippaux –smairk index for right foot



7. Correlation of mechanical low back pain and staheli index for left foot



8. Correlation of mechanical low back pain and staheli index for right foot



DISSCUSION:

Oswestry low back pain disability index and assessment of foot alignment was completed by 120 participants.

The Oswestry low back pain disability index is used to assess the severity of low back pain. The study showed that 93.33% people have minimal disability mean the patient can cope with most living activities. 6.67% people have moderate disability means the patient experiences more pain and difficulty with sitting, lifting and standing. Traveling and social life are more difficult and they may be disabled from work. Personal care, sexual activity and sleeping are not grossly affected and the patient can usually be managed by conservative means. Most of people complained about having more difficulty while lifting object, followed by prolonged standing.[11,12]

Foot alignment assessment was done by the foot posture index-6 and foot print analysis. In foot posture index there were six criteria assessed. It helped to assess the type of foot which person has i.e. it helped to identify if the feet are pronated, supinated or normal. The study shows that there is difference between left and right foot. The study shows that 35.83 % people have normal feet, 45% have pronated feet and 19.17% supinated feet on left side. There are 33.33 % people have normal feet, 47.50% have pronated feet and 19.17% supinated feet on right side.

For foot print analysis Clarke's angle, Chippaux-Smairk index and Staheli index were used. Clarkes angle helps to measure the internal longitudinal arch. It measures Angle between line A, that joins the more internal point of the forefoot and the more internal point of the rearfoot, with line B, that joins the more internal point of the forefoot with the deeper part of the footprint.[16] Statistics show that on left foot 48% people have normal angle, 40% tendency to flatness or pronation and11.67% people have cavus foot. On right foot 40.83% people have normal angle, 46.67% tendency to flatness or pronation and12.50% people have cavus foot.

Chippaux-smairk index indicates the area of the midfoot on a smooth surface. It is measured by dividing the value of the narrower zone of the midfoot (E) by the value of the parallel line on the wider zone of the forefoot (D), and multiplying by 100.[17] Statistics shows that on left foot 62.50% have normal index, 25.83% have tendency to flatness and or pronation, and 11.67% have cavus foot. On right foot 60.83% have normal index, 30% have tendency to flatness and or pronation, and 9.17% have cavus foot. Results show that right side is much more affected than left side.

The study shows that, there was clearly evidenced that the alteration of the medial longitudinal arch leads to changes in the lumbar curvature. The decrease in this arch was the most common finding in the population studied and was correlated with the increase in lumbar curvature, followed by the increase of the arch, which was correlated with lumbar rectification.[8]

After getting the foot variation in adults, surprisingly there were no correlation between the mechanical low back pain and foot alignment.

Likely that in individuals with low back pain, the changes in lumbo-pelvic alignment arising from planus foot posture when standing would be compensated for by consciously altering the alignment of the lower limb.[9]

Presence of low back pain alters the lumbo-pelvic rhythm, which also alters the biomechanics of the lower limb. The study shows that there is typical variability between same day and different day test in lumbo-pelvic rhythm [4].

Some subject has undiagnosed deformity i.e. planus or cavus foot. This deformity may be due to trauma, muscle weakness/ tightness, ligament laxity, plantar fasciitis, paralysis or a foot with pronation, muscle imbalance and medical conditions So presence of this deformity may lead to changes in lumbar spine.[19, 8.] If these changes not corrected then presences of prolonged change in lumbar spine leads to spinal and lower limb deformity. Due to these changes postural imbalance[7] and pain occurs. To avoid these postural imbalances and pain postural changes occurs. Prolonged postural changes causes less pain as compared to other subjects [4]. The study also suggests that postural changes contribute to low back pain, caused by the overburden applied or sustained for a long period of time, resulting in cumulative tissue stress.[20]

CONCLUSION:

The study shows that there is no correlation of Mechanical Low Back Pain And Foot Posture Index, Clarkes Angle And Staheli Index but a weak negative correlation was seen with Chippaux-Smairk Index.

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