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Effect of mat pilates on flexible flat feet

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ABSTRACT

The purpose of the study was to determine the effect of pilates exercises on flexible flat feet in order to improve medial longitudinal arch of flatfoot and to identify whether there is any difference in the correction of flat feet between pilates exercises and the foregoing programme. 24 college students with flexible flat feet with arch index values >0.26 were selected, which included 18 students with bilateral flat feet and 6 subjects with unilateral flat feet and were randomly allocated into two groups. The intervention in the experimental group included pilates exercises and control group included intrinsic foot muscles (IFM) strengthening programme for 30 minutes, 3 times/week for 8 weeks. In the inter-group comparison conducted through arch index values, the pilates exercise group showed significant decreases in arch index values of both right and left foot. Among intra-group comparison, the pilates and Intrinsic foot muscle (IFM) group both showed significant decreases in arch index values of both right and left foot. In the present study, it could be seen that pilates exercise programme is more effective on flexible flat feet than IFM training alone.

Keywords: Pilates exercises, IFM training, Flexible flatfoot, Arch index

INTRODUCTION

Feet, as the body's base of support, continually endure often high ground reaction forces generated during activities of daily living. Flatfoot is often a complex disorder, with diverse symptoms and varying degrees of deformity and disability. Flexible flatfoot is one of the most common types of flatfoot.

A flexible flatfoot has an arch that is present in open kinetic chain and lost in closed kinetic chain. It typically begins in childhood and adolescence

and continues into adulthood. Patients with flexible flatfoot may present with postural symptoms as well as weakness and fatigue in the foot and leg. This condition will cause decreased body efficacy, premature fatigue sense, back pain and secondary deformity in an individual.

Causes of flexible flat feet include obesity, which increases static and dynamic loading on feet, compensations for other abnormalities further up the leg, rupture of ligaments or tendons in foot. Some of the problem for pronation and flat arches

can come from muscle weakness or imbalance in feet, and the other half is the strength and mechanics at your hips (inner/outer thigh muscles, glutes, hamstrings) and into your pelvic floor and core.

Inefficient active support of MLA may contribute to injuries such as plantar fasciitis, medial stress syndrome, Achilles tendinitis, it causes increase in Q angle, tibial medial rotation, pelvis shifts anteriorly with increase in lordosis as COG shifts anteriorly causing a lot postural imbalances.

Authors reported that the prevalence of flexible flatfoot in children (2-6 yrs) is between 21% and 57% and the percentage has decreased to 13.4% and 27.6% in primary school children. The prevalence of flatfoot among 18-25 yrs age group was found to be 11.25% in India.

However, the common training methods for foot related research, treatment, and prevention have typically included flat-footed exercises such as towel-gathering or toe exercises, but the effects of such training have not been clarified.

Pilates is an acronym for Proximal Integrating Latent Agile Toning Exercise System. It is a physical fitness system developed in the early 20th century by Joseph Pilates yet not been used popularly. Pilates technique asserts that physical energy exerted from the center should coordinate movements of the extremities: pilates is flowing movement outward from a strong core. The core musculature is engaged by reflexes in response to your actions and reactions. When the core is not functioning properly it results in significant limitations with respect to flexibility as well as

asymmetries between the right and left side of the body. Imbalances in muscles groups including agonist and antagonist can all create a need for the core to compensate. The brain recognises movement patterns and not simply muscle groups. Yet professionals are still stuck in isolation training or muscle group training of the foot Our feet are such important parts of the body as they provide a foundation for all of the work we do every single day. Thus it is crucial that we protect our feet by strengthening and correcting alignment in the rest of our body.

There are only two case studies with single case reports done by Naïke Durel and Melissa Zimmerman which demonstrates the effect of pilates on flexible flat feet. Hence, there is need to study effect of pilates on flexible flat feet.

Method and procedure

24 subjects were selected from MAEER's Physiotherapy college which included males and females in the age group of 18-22 yrs with arch index >0.26 with bilateral and unilateral flexible flat feet and subjects with pott's fracture, RA, rigid flat foot and flat feet due to neurological conditions were excluded. The subjects were randomly allocated in two groups experimental and control which included 18 bilateral flat feet and 6 unilateral flat feet subjects. 12 subjects will be selected as experimental group and 12 as control group with bilateral flat feet and 3 subjects as experimental and 3 as control group with unilateral flat feet. Arch index was used as outcome measure, calculated before and after the intervention for the two groups.

Experimental group was given pilates program

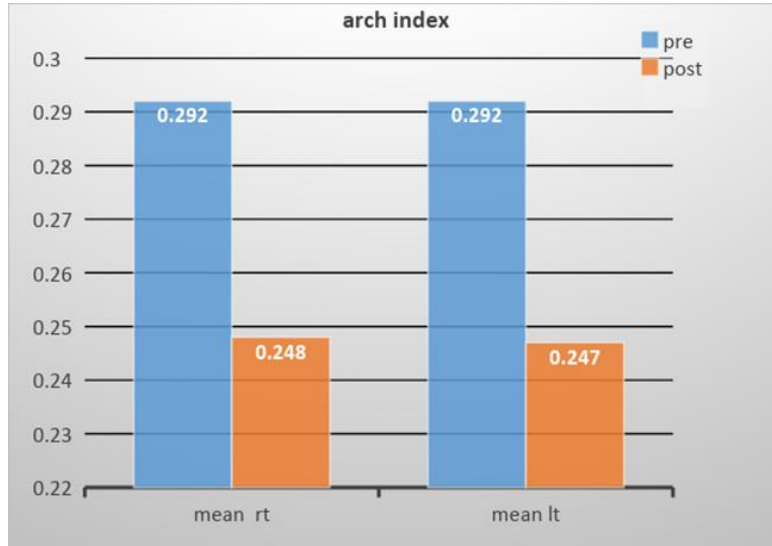
Week 1	Warm up exs- Pelvic curl,,spine twist,	Beginner exs	Repetitions
		AB prep, breast stroke prep	5
Week 2		Single leg stretch	5
Week 3		Side leg series	5
Week 4		Half roll oblique	5
Week 5		Double leg stretch	8
Week 6-8	Foot work	Single leg toes, Single leg heel, Parallel toes, parallel toes	8
	Harmstrings and quads stretches at the end of the session		

Control group was given intrinsic muscle strengthening programme which included towel

crumpling, toes spreading, MTP extension, calf raises exercises (8 reps) for 3 times/week.

DATA ANALYSIS AND GRAPHICAL REPRESENTATION

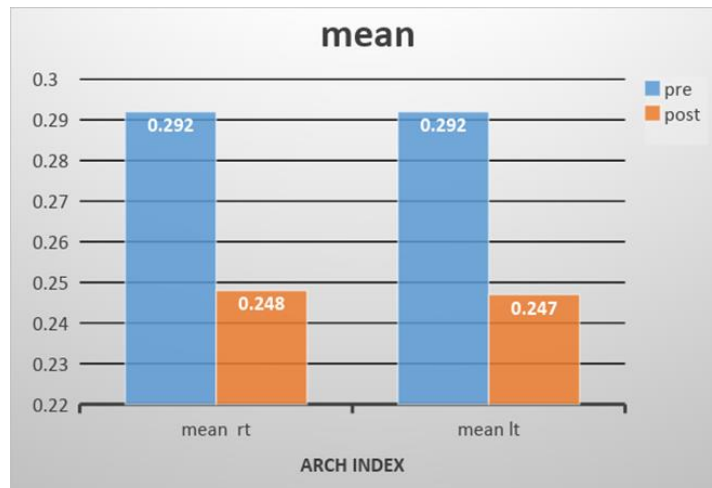
Control group



The pre and post arch index values for bilateral flat feet subjects were analysed using paired t-test

Arch Index	Mean	SD	P value	t value	significance
Right	PRE 0.313	0.0367	0.0005	5.625	Extremely Significant
	POST 0.285	0.0308			
Left	PRE 0.301	0.0434	0.0035	4.082	Significant
	POST 0.284	0.0496			

Experimental group



The pre and post arch index values for bilateral flat feet subjects were analysed using paired t-test:

Arch Index		Mean	SD	P value	t value	significance
Right	PRE	0.292	0.0248	<0.0001	8.667	Extremely Significant
	POST	0.2248	0.3333			
Left	PRE	0.292	0.0311	0.0009	5.121	Extremely Significant
	POST	0.287	0.0156			

EXPERIMENTAL AND CONTROL GROUP



and control group was analysed using unpaired t-test

RIGHT FOOT (BILATERAL FLAT FEET)				
	Mean Difference	P value	t value	Significance
EXPERIMENTAL	0.0466	0.0094	2.948	Very significant
LEFT FOOT(BILATERAL FLAT FEET)				
	Mean difference	P value	t value	Significance
EXPERIMENTAL	0.0444	0.0359	2.290	Significant
CONTROL	0.0222			
LEFT FOOT(UNILATERAL FLAT FEET)				
	Mean difference	P value	t value	Significance
EXPERIMENTAL	0.0533	0.0058	5.367	Very Significant
CONTROL	0.0133			

DISCUSSION

The results obtained after 8 weeks of pilates mat training was that there was improvement in the medial longitudinal arch height i.e. a decrease in

value of arch index < 0.26 in subjects with bilateral and unilateral flexible flat feet.

The main findings of the current study on the effect of mat pilates programme on flexible flat feet are that pilates mat exercises significantly reduced

the arch index i.e. improved the height of medial longitudinal arch (MLA) and is more effective than the foregoing exercises i.e. intrinsic foot muscle (IFM) training in both bilateral and unilateral flexible flat feet individuals.

There was reduction in arch index values in both bilateral and unilateral flat feet individuals of experimental group arch index values for right foot reduced by 0.0466 and left foot reduced by 0.0444 in bilateral flat feet individuals with a p value <0.01 which is very significant and arch index values for left foot in unilateral flat feet individuals reduced by 0.0533 with a p value of <0.01 which is very significant. On the other hand for the control group; the arch index values for right foot and left foot reduced by 0.0277 and 0.0222 with p value of 0.0005 and 0.0035 which is significant in bilateral flat feet individuals and arch index values for left foot in unilateral flat feet individuals reduced by 0.0133 with a p value of 0.18 which is not significant.

Research suggests dysfunction of musculature of the lumbopelvic-hip complex is involved lower extremity functional changes and is related to the development of excessive foot pronation. Strength of the muscles of the lumbopelvic-hip complex (core muscles) is suggested to be essential to controlling hip abduction, subsequent internal rotation of the femur and potentially more distal movement. Pilates improves core stability, which is the ability to safely control movement of your spine while performing your desired activities. The recruitment of specific core muscles that allows you to stabilize your joints and control movement. It leads to recruitment of local stabilizers which include transversus abdominis, pelvic floor muscles, multifidus and diaphragm. It leads to engagement of other stabilizers like gluteus maximus which prevents collapse of arches when weight bearing thus maintaining a "lifted arch" as suggested by Bruce Thomson. It improves pelvic floor strength, Transversus abdominis, multifidus, glutes, erectae spinae and psoas muscle strength, which helps to lift your pelvis off your legs for a freer stride. And proper breathing habits helps to lift your and torso away from your pelvis. This keeps you from having all your upper body weight jammed down on your legs. Pilates mat training programme not only strengthens the muscles but also corrects the posture and alignment in the body

thus reducing compensation in the other parts of your body.

Intrinsic foot muscles (IFM) play a key role in postural control and are important to stabilize foot and maintain balance during single leg stance. IFM slowly lengthen eccentrically during the MLA compression and shortens as the arch recoils thus preventing foot pronation. It allows mechanical energy to be stored in the MLA and subsequently to be released during each foot contact. This is considered attributable to the fact that IFM exercises improved the functions and activity of the abductor pollicis muscle that plays the role of bearing the weight and pushing the body forward during push off in gaits and the flexor hallucis brevis muscle that maintains the MLA to maintain foot stability.

Therefore, the present study is intended to improve the MLA of flatfoot and to identify effective application method.

This study suggests that pilates exercises can be used as an intervention for correcting flexible flat feet as these exercises not only focuses on specific intrinsic muscle strengthening but helps to develop proper motor control, recruitment of appropriate muscles to control movement patterns

CONCLUSION

The study concluded that pilates exercise programme is more effective significantly on flexible flat feet i.e improved the height of medial longitudinal arch than IFM training.

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REFERENCES

- [1]. Rehabilitation with Pilates-flat feet (pes planus): A case study: Naiké Durel Montreal, Canada, 2016.
- [2]. Ashwini Chougala, Vidit Phanse*, Erohit Khanna, Sudipta Panda, SCREENING OF BODY MASS INDEX AND FUNCTIONAL FLATFOOT IN ADULT: AN OBSERVATIONAL STUDY.
- [3]. Takayuki HasHimoTo, PT, MS1, 2)*, keisHoku sakuraba, MD, PhD: Strength Training for the Intrinsic Flexor Muscles of the Foot: Effects on Muscle Strength, the Foot Arch, and Dynamic Parameters Before and After the Training.
- [4]. D.Krupa Daniel, Chithambaram Chandrasekaran, Ajith Mano: A STUDY ON PREVALENCE OF FLAT FEET AMONG SCHOOL CHILDREN IN KANCHIPURAM POPULATION.
- [5]. The Effects of Corrective Exercise Program on Flat Foot Deformity of Male and Female Students Farhad Kouhi Achachlouei, Scholars Research Library, Annals of Biological Research, 3(2), 2012, 988-99.
- [6]. Mehmet Ekmen 16/12/2012 BASI CTTC 2012 İSTANBUL PILATES FOR FLEXIBLE FLAT FEET
- [7]. Prevalence of flat foot among 18 -25 years old physiotherapy students: cross sectional study. ; Miss. Tejashree Bhoir, 15 September, Indian Journal of Basic and Applied Medical Research, 3, 2014.
- [8]. Arch Index: An Easier Approach for Arch Height (A Regression Analysis) : Hironmoy Roy1*, Kalyan Bhattacharya2, Samar Deb3 and Kuntala Ray4
- [9]. Evaluation of the medial longitudinal arch: a comparison between the dynamic plantar pressure measurement system and radiographic analysis Nadir YALÇIN,# Erdinç ESEN, Ulunay KANATLI, Haluk YETKİN.
- [10]. Effect of Obesity on Arch Index in Young Adults Authors Sneha Sameer Ganu, Lecturer, MGM College of Physiotherapy, Kamothe, Navi Mumbai, Vrushali Panhale, Associate Professor, MGM College of Physiotherapy, Kamothe, Navi Mumbai.
- [11]. Pilates for reducing pain in posterior tibial tendon injuries:A Case study. Melissa Zimmerman, 30,, newyork:rch; : 3(4), 2014, 27.
- [12]. The effects of short foot exercises and arch support insoles on improvement in the medial longitudinal arch and dynamic balance of flexible flatfoot patients, Eun-Kyung Kim, PT, PhD1, The Journal Of Physical Therapy Science, 2016, 3136-3139
- [13]. Management of lower extremity malalignment during running with neuromuscular retraining of the proximal stabilizers: Nelly Lugo-Larcheveque, urrent sports medicine reports, 5(3), 14, 137-140.
- [14]. The relationship between foot motion and lumbopelvic hip function: A review of literature: Alex Barwick, 2012.

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