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### The effect of insole with corrective exercises on some of physical and motor fitness factors in girls with flat foot

<sup>1</sup>Mehrnaz Faraji Shahrivar, <sup>2</sup>Yahya Sokhanguie and <sup>1</sup>laleh Behboodi

<sup>1</sup>Department of Physical Education, Islamic Azad University, Islamshahr Branch, Tehran, Iran

<sup>2</sup>Department of Physiotherapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

#### ABSTRACT

*In this study the effect of insole utilization at the same time with corrective exercises in 9-12 years old female pupils with flat foot is survived. Materials and methods: in this study, twenty 9-12 female pupils with flat foot deformity were randomly chose, and they were treated with a corrective exercises period (18 sessions in 1 month and half) together with insole utilization. Some of physical and motor fitness factors were evaluated before and after insole utilization together with corrective exercises. Data were analyzed using nonparametric willcoxon test. Findings: obtained results showed that insole utilization together with corrective exercises have positive and significant effects on balance, agility, speed, muscular power and cardiovascular endurance factors. Conclusion: according to the results, corrective exercises program together with insole utilization is recommended for physical and motor fitness improvement of children.*

**Key words:** Flat foot, Corrective exercises, insole.

#### INTRODUCTION

Foot, as the other parts of human body experiences many structural changes. Medial longitudinal arch (MLA) height is one of the most important and variable structural properties of foot [2].

Reduction of this arch height is called as flat foot. Flat food is defined as decrease of medial longitudinal heel valgus deformity and internal knob of talus. Many factors cause this deformity that ligamentous laxity, rotational deformity of tibia, accessory navicular, cognetial vertical talus and bridge between bones could be mentioned as the most important factors [12,8]. Inheritance, overweight, geographic and cultural factors such as how to wear shoe, are effective in incidence and intensity of flat food [9].

Flexible foot incidence is reported 21% to 57% in 2 to 6 years old children and is decreased to 13.4% to 27.6% in elementary pupils. Generally babies are born with flexible flat foot and foot arch rapidly develops between the ages of 2 to 6 and structurally ripens at the age of 12 to 13 [10].

Flat foot causes many unpleasant side effects such as heel pain, bunion (protrusion of big toe joint) hammer toe, shin splints (front leg pain), and knee, hip and low back pain. If flat foot diagnose on time and required actions [13,16] in

order to prevent exacerbation perform, the side effects could be prevented[11]. Strengthening the muscles and ligaments around the ankle is recommended for flat foot treatment and improvement [15]. Corrective exercises and insole and medical shoe utilization are some methods of flat foot treatment [11].

As corrective exercises are stretching or flexibility and power exercises and exercising requires physical mobility and activity, so exercise and physical activity is recommended for improvement of abnormalities in many sport texts [6]. Also various orthotics are designed and used for foot medial longitudinal arch support and decrease of side effects due to flat foot [16]. Recently biomechanical studies have shown that insoles improve the medial longitudinal arch line and increase stance phase time during walking on the smooth surface. So they decrease feet angular deformities that are side effects of flat foot [16]. During many studies, walking properties of healthy people and people with flat foot are survived. These studies show that people with flat foot have foot with more arm and plantar flexion angle in ankle [4].

Studies showed that, there are little evidences about the effect of corrective exercises and insole use on flat foot improvement. Furthermore it is not obvious that if corrective exercises at the same time with insole use can influence physical and motor fitness or not?

A similar study in this field by Movahedmanesh(2008) Showed that corrective exercises at the same time with insole use improved agility and balance and did not affect speed significantly [7].

So, the aim of this study was to find out the effect of corrective exercises at the same time with insole use on some of physical and motor fitness factors of 9-12 years old girls with flat foot.

#### MATERIALS AND METHODS

This semi-empirical survey is a kind of randomized clinical trial. Research samples were 20, 9-12 years old pupils with flat foot that were randomly chosen from clients of corrective exercises club of area 19 Tehran Education Office. Pupils with the written consent from their parents regarding radiography result were examined by specialist and primary diagnosis of researcher that was performed by navicular disability index test, confirmed. Pupils did not have any special disease and they had never used insole or any assistance instrument.

First, tests results were recorded before intervention. In order to assess physical and motor static, balance, agility, speed, cardiovascular endurance and muscular power the tests including stroke balance stand, shuttle run, fifty yard dash, six hundred yard-walk and sergeant jump test were respectively used in this study.

After recording test results, special corrective exercises were done in corrective exercises club of area 19 for one month and half or 18 sessions (one hour in every session and 3 sessions in a week). Pupils were using insole and medical chair prescript by orthopedist in addition of corrective exercises during 6 weeks. After 6 weeks pupils were examined by physical and motor fitness tests and results were recorded and the independent variables effect on subjects were assessed.

Statistical analysis method: Statistical analyses were performed using SPSS software. In order to evaluate normality of data distribution ShapiroWilk test were used and because of the lack of normality willcoxon test were used for comparison of pretest and post test in groups. Significant level was considered  $P < 0.05$  in all tests.

#### RESULTS

Physical properties of triable participants are presented in table 1.

**Table1. Properties of participants in this study (mean  $\pm$  standard deviation)**

Group	Age mean and Std.deviation (year)	Length mean and Std.deviation (cm)	Weight mean and Std.deviation (kg)
corrective exercises method and insole	11 $\pm$ 0.973	150 $\pm$ 6.77	44.51 $\pm$ 9.53

According to table 2 test results showed that, 9-12 years old girls with flat foot that have used corrective exercises method and insole had considerable progress in post test performance in statistic balance ( $P=0.001$ ), agility

( $P=0.001$ ) speed ( $P=0.000$ ), cardiovascular endurance ( $p=0.000$ ) and muscular power ( $p=0.001$ ) and significant ( $P<0.05$ ) improvement were observed.

These findings was indicating improvement of physical and motor fitness level of triable participants following insole use and corrective exercises for one month and half.

**Table2. Willcoxon test results for comparison of pre tests and post tests of physical and motor fitness.**

Source of variability	mean and Std.deviation		Mean Rank	Z	P
	Pre test	Post test			
statistic balance(s)	5.75±3.28	7.85±3.64	5	-3.4	0.001
Agility(s)	13.11±1.238	12.395±1.004	11.62	-3.454	0.001
Speed(s)	10.961±0.936	9.743±0.744	10.5	-3.921	0.000
cardiovascular endurance(s)	25.8±5.899	27.85±5.751	11.26	-3.661	0.000
muscular power(cm)	220.25±28.818	206.5±25.192	9	-3.233	0.001

## DISCUSSION

Result of present study was indicating positive and significant effect of corrective exercises and insole use on balance, agility, speed, cardiovascular and muscular power factors in girls with flat foot. Tsai researches has been shown that people with normal foot have better posture control compared to people with flat foot[14].

Our results is confirmed by Tsai et al (2006)[14] and khodaveisi et al (2009)[5] researches, because people with flat foot show a lower balance before corrective exercises and insole use but following corrective exercises and insole use their muscular power and motion of lower limb joints improve and it has a positive effect on balance. Present results, expressing effect of corrective exercises, are consistent with Ghoreishi (2007), Meyer (2003) and Van Boerum and sangeor (2003)researches. These researchers proposed that, strengthening of muscles and ligaments around the ankle joint could be used for flat foot treatment[7,6,15]. Power exercises influence muscle tendon length, more different skeletal parts and cause stability and perseverance of ligaments, Meyer stated. On the other hand stretching exercises work as coordinator of sympathetic and parasympathetic muscles [6].

Movahedmanesh (2008) following her researchers concluded that, insole use and corrective exercises have had significant effect on agility and balance and non significant effect on speed [7].

Whilst, the method of corrective exercises at the same time with insole use showed significant effect on physical and motor fitness factors, in present study. Probably, corrective exercises at the same time with insole use have led to stimulation and improvement of proprioception and improvement of power and lower limb joints line in triable participants and also it has caused improvement of foot arch and decrease of lower limb muscles fatigue and improved range of motion and all of these have led to improvement of physical and motor fitness factors (balance, agility, speed, muscular power and cardiovascular endurance) in this study.

In people with flat foot muscular activity also changes because of lower limb biomechanical changes so that leg and foot muscles might front with sever fatigue and abnormal walking because of too much activity. These people often complain of early fatigue following walking that is because of their high muscular activity [3]. Since, abnormalities cause motor limitation, decreases of joint flexibility and motility and generally disturb anatomic and physiologic and motor structure of body, so it influence physical and motor fitness factors and decreases body fitness levels and endangers general body health [1].

## CONCLUSION

Previous researches showed that treatment methods of corrective exercises at the same time with insole use could be a suitable method for flat foot treatment.

Also it was indicated in this study that corrective exercises at the same time with insole use method is effective on some of physical and motor fitness factors improvement in people with flat foot.

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