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گزارش مختصر

کف پای صاف انعطاف‌پذیر (flexible) غیرقابل انعطاف (rigid) در میان افراد دارای اضافه وزن ماهراشترا (هند)

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چکیده

مقدمه: *قوس‌های پا، بخش الزامی از مجموعه پا هستند. این قوس‌ها توسط رباط‌ها و ماهیچه‌ها حمایت می‌شود. بسیاری از عوامل باعث مسطح شدن این قوس (کف پای صاف) می‌شوند. یکی از این عوامل، اضافه وزن است. اما نوع کف پای صاف که به‌دلیل اضافه وزن ایجاد می‌گردد، هنوز مشخص نیست. بنابراین هدف از این تحقیق یافتن شیوع انواع مختلف کف پای صاف به‌دلیل اضافه وزن است.*

مواد و روش‌ها: *۹۶ نفر بین گروه سنی ۱۸ تا ۳۵ سال در این مطالعه شرکت کردند. این مطالعه توسط کمیته اخلاق دانشگاه دیمد (Deemed) تصویب شد. BMI با استفاده از شاخص qutelet و کف پای صاف با استفاده از فوت پرینت تعیین شد. نوع فوت پرینت با استفاده از آزمون گسترش Toe extension تعیین شد.*

نتایج: *نتایج مطالعه نشان داد که کف پای صاف غیرقابل انعطاف (**rigid**) بیشتر از کف پای صاف در افراد دارای اضاف وزن مشاهده می‌گردد.*

نتیجه‌گیری: *همبستگی قابل‌توجهی بین BMI و شیوع کف پای صاف وجود دارد در حالی که همبستگی کف پای صاف با سن و جنسیت وجود ندارد.*

واژه‌های کلیدی: کف پای صاف انعطاف‌پذیر، کف پای صاف غیرقابل انعطاف، اضافه وزن.

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ارجاع: شارواری ساهاسرابوده، چوتای خوشبو، اسمیتا پاتیل، امروتکوار رایجاد، سالوخه. کف پای صاف انعطاف‌پذیر (flexible) غیرقابل انعطاف (rigid) در میان افراد دارای اضافه وزن ماهراشترا (هند). مجله دانش و تندرستی در علوم پایه پزشکی ۱۴۰۰؛۱۶(۲):۵۱-۵۵.

Introduction

There are three major arches of foot the transverse arch, medial and lateral longitudinal arch. The main role of these arches is support during various activities like walking, jumping, running the arches of foot are maintained not only by the shapes of the bones but also by the ligaments. The plantar calcaneo-clavicular (spring) ligament, the interosseous talocalcaneal ligament, deltoid ligament, and the plantar aponeurosis provide key passive support the medial longitudinal arch.[1] The laterally located long and short plantar ligaments supports the lateral longitudinal arch and also support the medial longitudinal arch. The plantar aponeurosis (plantar fascia) is a dense fascia that runs nearly the entire length of the foot. The dynamic support is maintained by the tibialis posterior, tibialis anterior, peroneus longus, flexor digitorum longus and peroneus tertius.[2] Flatfoot is also called fallen arches in which generally the medial longitudinal arche collapse. It can develop due to prolong stress to the foot, obesity, faulty biomechanics or injury to the foot.[3]

Overweight has shown to negatively affect the foot structure and function in both adults and children as compared to there leaner counterparts. As excessive amounts of weight are forced upon the feet, the muscles tendons and ligaments that hold up the arch, and become weak, which inturn causes arches to collapse.[4] When the body weight moves from the rear foot to midfoot at midstance the medial longitudinal arch begins to collapse, causing a flatfoot.

Flatfoot is categorized into two types: Flexible Flatfoot and Rigid Flatfoot. Flexible flat foot is characterized by normal arch during non-weight bearing and flattening of arch on weight bearing. Rigid Flatfoot is characterized by a stiff, flattened arch in both weight bearing and non-weight bearing. Toe extension test is a quick test which helps to asses flexible flatfoot and Rigid Flatfoot.[5] Ink print method is a popular method used to determine foot posture, thus this is used. Along with ink method Dennis method is used to determine the navicular height as it is an important tool in finding pes planus. It has a reliability of 0.87-0.96 in assessing the height of the medial longitudinal arch.[6]

Overweight has been shown to negatively affect foot structure and function in adults. Increase in body weight results in increased static and dynamic plantar pressures, causing significant change to the structure of the feet.[7] These structural changes appear to be associated with increased foot discomfort and foot pain.[8] There has been which show the evidence of flatfoot in overweight individuals, but there is no evidence of study whether the flatfoot is Flexible flatfoot and/or rigid flatfoot.[4] Hence this study is being conducted to assess the prevalence of flexible flatfoot and rigid flatfoot in overweight individuals.

Materials and Methods

The study was a observational type of study in which total of ninety six adults (n=51 female 56, n=40male) met the inclusion criteria and had participated in the study. The sampling method was randomized sampling .The participants in the study were from the age group of 18-35 years, both male and female volunteered in the study. All the participants were thoroughly explained about the need and purpose of the study and an informed consent was obtained. The study was also approved by the Institutional Ethics Committee(IEC).

Inclusion Criteria

1) Individuals with flatfoot calculated using ink method.
2) Overweight individuals calculated using BMI by Quelet Index .
3) Both Male and Female .
4) Individuals physically active doing activity for atleast 45 minutes for 5 days a week

Exclusion Criteria

1) Any foot pathology or lower limb fracture.
2) Individuals with any history of lower limb trauma.
3) Individuals undergone any foot surgery
4) Individuals present with any type of pain.Individuals using Insoles.

- Type of study: Observational
- Study design: Analytical Type
- Place of study: Krishna College, Krishna Hospital, Physiotherapy OPD
- Year study was conducted: 2019-2020

Outcome measures:

Body mass Index: The height of the subject was measured by using inch tape by making him stand with heel, shoulder, buttocks and occiput touching the wall. The weight of the subject was measured using a weighing machine. Both the variables were used to calculate the body mass index using Qutelet index protocol: Weight(kg)/height^2(m). The participants were classified by their BMI score and scored accordingly.

Foot structure assessment: Dennis method: All the participants were asked to wash there foot properly and dried. There foot was impregnated with the stamp ink and the impression was taken on a white paper with bare foot relaxed in an anatomical position. There foot measurements were taken and scored according to Denis Method. Interpretation of this method is by following scoring criteria. Normal – Lateral edge of the foot is supported by 4th and 5th metatarsal, Grade 1- Lateral edge of the foot is half of that the metatarsal support, Grade 2- Support of the central zone and forefoot are equal and Grade 3- Support of the central zone of the foot is greater than the width of the metatarsal support.[6] The plantar foot print were then classified according to Denis and second and third grades were considered to be flatfooted.

Toe extension test: Passive dorsiflexion of great toe indicates the differences between flexible and rigid flat foot. Appearance of medial longitudinal arch indicates flexible Flatfoot during great toe Passive dorsiflexion. Non-appearance of medial longitudinal arch (MLA) on medial aspect of the foot indicates that the rigid flat foot during great toe passive dorsiflexion.[5]

Results

As per the statistics seen in figure 1, it can be seen that among the 96 participants selected for this study, 32 participants were of the age group 18-24 years, out of which 75% of that population had rigid flat foot whereas only 25% had flexible flat foot. Out if 96 participants, 43 participants belonged to the age group of 25-29 years, of which 57% had an incidence of rigid flat foot and 43% had a prevalence of flexible flat foot. The remaining 18 participants belonged to the age group of 30-35 years, of which 61% had rigid flat foot and 39% had flexible flat foot. From the above statistics it can be concluded that, the prevalence of rigid flat food is higher as compared to the flexible flat foot.

As per seen in table1, using the unpaired T test, it can be seen that the p value for age and prevalence of rigid or flexible flat foot is not significant. Hence, this concludes that, there is

no correlation between age and prevalence of rigid or flexible flat foot.

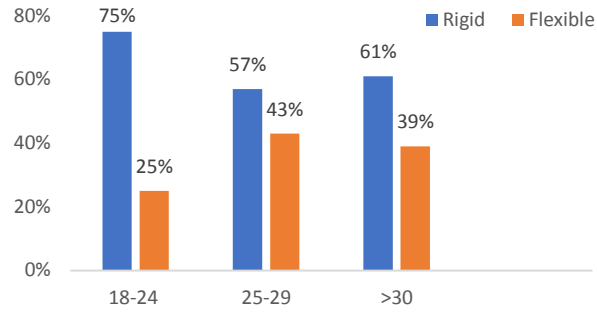

Figure 1. Corelation between Age and Prevalence of rigid and flexible flat foot

As per the statistics seen in figure 2, it can be seen that among the 96 participants selected for this study, 34 participants had BMI less than 26, out of which 76% of that population had rigid flat foot whereas only 24% had flexible flat foot. Out if 96 participants, 36 participants had BMI in the range of 26.1 to 28, of which 72% had an incidence of rigid flat foot and 28% had a prevalence of flexible flat foot. The remaining 26 participants had BMI higher than 28.1, of which 69% had rigid flat foot and only 31% had flexible flat foot. From the above statistics it can be concluded that, the prevalence of rigid flat food is higher as compared to the flexible flat foot.

With reference from table 2 , using the unpaired T test, it can be seen that the p value for BMI and prevalence of rigid or flexible flat foot is significant. Hence, this concludes that, there is correlation between BMI and prevalence of rigid or flexible flat foot.

As per the statistics seen in figure 3, it can be seen that among the 96 participants selected for this study, 46 participants were males, out of which 63% of that population had rigid flat foot whereas 37% had flexible flat foot. Out of 96 participants, 50 participants were females, of which 72% had an incidence of rigid flat foot and 28% had a prevalence of flexible flat foot. From the above statistics it can be concluded that, the prevalence of rigid flat food is higher as compared to the flexible flat foot.

From table3 using the unpaired T test, it can be seen that the P.Value for Gender and prevalence of rigid or flexible flat foot is not significant. Hence, this concludes that, there is no correlation between Gender and prevalence of rigid or flexible flat foot.

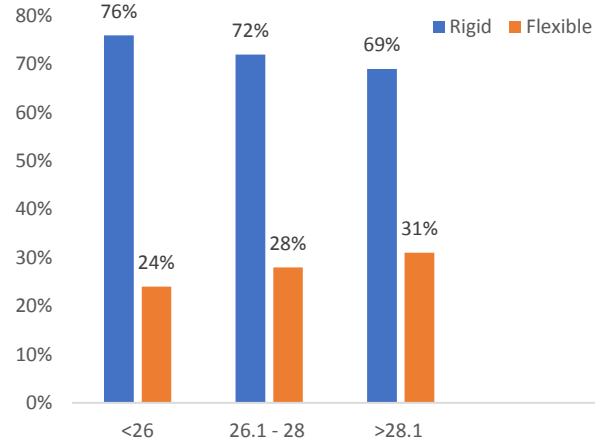

Figure 2. Correlation between BMI and prevalence of rigid and flexible flat foot

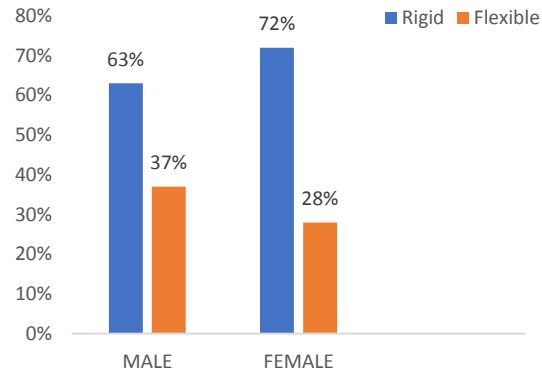

Figure 3. Corelation between Gender and Prevalence of rigid or flexible flat foot

Table 1. Correlation between Age and prevalence of rigid and flexible flat foot

Demographic study variable	Rigid flat foot		Flexible flat foot		T value	P.V
	Mean	Standard Deviation	Mean	Standard Deviation		
Age	27.11	7.3	25.18	6.2	1.398	0.164 (Not Significant)

Table 2. Correlation between BMI and prevalence of rigid and flexible flat foot

Demographic study variable	Rigid flat foot		Flexible flat foot		T value	P.V
	Mean	Standard deviation	Mean	Standard deviation		
Body mass index	26.46	1.13	27.17	1.59	2.267	0.0257 (Significant)

Table 3. Corelation between gender and prevalence of rigid and flexible flat foot

Demographic study variable	Rigid flat foot		Flexible flat foot		T value	P.V
	Mean	Standard deviation	Mean	Standard deviation		
Gender	1.451	0.50	1.55	0.50	0.932	0.3537 (Not Significant)

Discussion

This study aims to establish the prevalence of rigid and flexible flatfoot in overweight individuals. it could also be seen in the study that there was a correlation between BMI and prevalence of flexible flatfoot (P=0.0257, significant). Literature has already proven that there is a direct association between BMI and Flatfoot prevalence. However in this study the type of flatfoot was determined with the help of toe extension test. In toe extension test, Great toe is passively extended. If there is appearance of medial longitudinal arch then it is considered to be flexible flat foot and if there is no appearance of medial longitudinal arch then it is considered to be rigid flatfoot. From the result of toe extension test it was concluded that the prevalence of rigid flatfoot is higher as compared to flexible flatfoot.

In a study conducted by which was done to determine the effect of prevalence, flexible and right flatfoot in relation of tightness of Achilles tendon and weakness of tibialis posterior tendon in individuals of 40-20 years among 200 participants, 26.3% had prevalence of flatfoot.[1] This study also used toe extension test to determine flexible and rigid flatfoot. It was interpreted from the study that tight calf muscles provide resistance to dorsiflexors which causes upward rotation of the foot resulting in abduction of forefoot and collapse of flatfoot medially and inwards. This study focuses on the providing knowledge about co-orelation between ankle and foot problems and incidence of flatfoot.

In another similar study which aims to determine the effect of obesity on foot structure and function and prevalence of flatfoot among college students, it was concluded that the obese subjects had 44% of overall prevalence of flatfoot as compared to other BMI groups.[3] This study also shows a strong association between weight and flatfoot grade variable.

On basis of Chi Square test P.Value was found, which seemed to be significant, thus establishing correlation between BMI and flatfoot.

According to the results there is prevalence of rigid flatfoot more than flexible flatfoot. This study also focuses on the relation of various factors such as BMI, age and gender to prevalence of rigid or flexible flat foot. It was concluded that there is a significant correlation between BMI and prevalence of rigid and flexible flat foot whereas there is no correlation of the flat foot with age and gender. This shows that overweight also affects the the foot complex. The study needs to be done on different age groups and validated using different techniques and methodology.

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BRIF REPORT

Prevalence of Flexible Flatfoot (Fft) and Rigid Flatfoot (Rft) Among the Overweight Individuals, Maharashtra, India

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Abstract:

Introduction: *The arches of foot are an integral part of foot complex. It is supported by ligaments and muscles. Many factors attribute to flattening of these arches. One of those factors is overweight. But the type of flatfoot which is caused due to overweight is not yet clear. Thus this project aims at finding the prevalence of different types of flatfoot due to overweight.*

Methods: *A total of 96 individuals between the age group of 18-35 participated in this study. The study was approved by the institutional ethics committee (IEC). Calculated BMI using qutelet index and flatfoot was determined using foot print. Type of foot print was determined using Toe extension test.*

Results: *The study result indicated that the prevalence of rigid flatfoot was more than flexible flatfoot in overweight individuals.*

Conclusion: *There is a significant correlation between BMI and prevalence of rigid and flexible flat foot whereas there is no correlation of the flat foot with age and gender.*

Keywords: Flatfoot, Flexible flatfoot, Rigid flatfoot, Overweight.

Conflict of Interest: No

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