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A mechanism for preventing lateral torque in walking for patients with diabetic neuropathic foot

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[2]*(IFIA Inv. Member, Verification Number: IR2021JAN252ECXD)*
[4]*(IFIA Inv. Member, Verification Number: IR2020MAR013DCXM)*
[6]*(IFIA Inv. Member, Verification Number: IR2021JAN251DCXS)*
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ABSTRACT:Orthopedic shoes are shoes that are specifically designed to support or accommodate the mechanics and structure of the foot, ankle and leg and they have a number of medically beneficial features and functions that separate them from everyday footwear. In general, wearing orthopaedic shoes is a good idea whenever there is any type of health issue that makes it painful to walk. This includes foot conditions that make wearing commercial shoes uncomfortable, or situations where walking in regular shoes causes fatigue and pain in the muscles or bones of the legs. This study introduces a new form of insole with provisional US patent number **63160007** for every type shoes. We have actually designed a new mechanic to prevent lateral torque in gait for patients who suffer gait problems due to certain conditions such as diabetic neuropathic foot. The most important benefit of this insole is that it creates balance when walking. This superiority leads to comfort in walking and satisfaction in patients.

KEYWORDS: Orthopedic shoes, Lateral torque, US patent, diabetic neuropathic foot.

I. INTRODUCTION

Orthopedic shoes give feet plenty of room to move, which can lead to better circulation. These shoes can also help minimize nerve-related pain, providing relief for people with diabetic neuropathy. When it comes to neuropathy, orthopaedic shoes are the best choice as they provide support, comfort, and protection to the feet [1-2]. Orthopedic shoes have a number of features, including:

1. **Great foot support:** Not giving your feet the support they need can lead to painful foot issues like plantar fasciitis or flat feet. Over time, the discomfort caused by these conditions can limit mobility. Orthopedic shoes can support the arches of the feet. They help cushion the entire foot, providing it with the support it needs. They can also correct foot alignment issues, minimize pain, and prevent existing problems from worsening [3-4].
2. **Improved circulation:** One of the main problems with diabetic neuropathy is that it prevents people from experiencing foot-related pain or discomfort. Without proper treatment, these foot problems can eventually cause serious problems that require more intensive treatments to correct or repair. Orthopedic shoes give feet plenty of room to move, which can lead to better circulation. These shoes can also help minimize nerve-related pain, providing relief for people with diabetic neuropathy [5].

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3. **Less foot pain:** The average person takes about 10,000 steps a day. When you consider this, it's easy to see how shoes that don't fit properly can make foot pain worse. The best way to overcome this problem is to invest in high quality orthopedic shoes that fit properly and provide plenty of support [6].
4. **An opportunity to heal or fix foot problems:** Most of the problems people have with their feet are caused by arch issues or misalignment issues. Arch problems can cause walking-related pain. Leaving these issues untreated can lead to increasing pain or discomfort. Worse, it can also cause long-term damage that requires invasive procedures such as surgery to repair. When people wear orthopedic shoes, they can not only prevent further damage, but they can also solve all the problems they currently have. In addition to solving alignment issues, the right shoes can keep their arch in top shape [6-7].
5. **Improved mobility:** A general decrease in mobility is one of the biggest problems experienced by people with foot pain or discomfort. Limited mobility can result from a number of different foot problems, ranging from heel spurs and bursitis to plantar fasciitis, flat feet and hammer toes. People with these conditions experience pain when walking. As a result, they often lead sedentary lives to avoid pain and discomfort. Orthopedic shoes are a viable option for people with foot pain that affects their mobility. These shoes cushion the feet and heal existing foot problems, making it easier for people to move around. This increased mobility can lead to a much better quality of life for those who suffer from sore feet [7].

When people think of orthopedic shoes they often associate them with older people who have foot or medical problems and need to wear shoes of this type. In reality though, orthopedic shoes are worn by people of all ages who suffer from poor foot mechanics as they are specifically designed to support the structure and mechanics of the foot, ankle and leg.

II. MATERIAL AND METHOD

In this research, we introduce a new mechanism which is placed on sole of a shoe and it can be preventing lateral torque in walking. Figure 1 illustrates the final form of this sole.

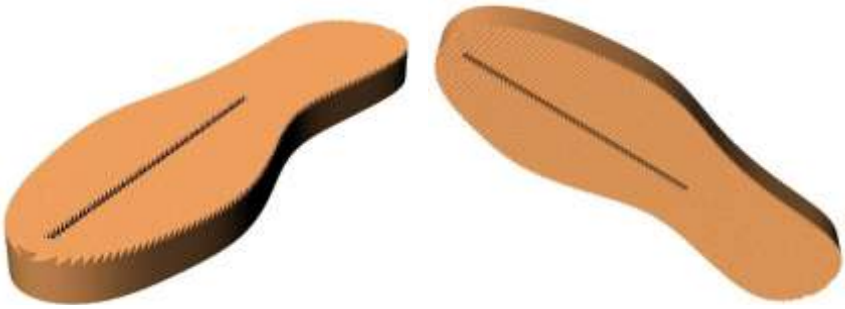

Fig. 1. Final schematic of sole

As can be seen in figure 1, this sole is designed in such a way that it can correctly distribute all the weight force of the users in all the soles of the feet. On the other hand, the shoe sole distributes the frictional force to at least one element and certain friction coefficients are defined for the shoe sole simultaneously. These benefits allow patients with diabetic neuropathy to walk more comfortably and experience less pain and discomfort.

This Provisional US Patent Invention with No. **63160007** was able to win Silver Medal (Romania, 2021), ISIF'21 6th International Invention Fair Certificate (Turkey, 2021), Award of MERIT (Malaysia- Croatia Technology Exchange 2021), Special Prize (Malaysia, 2021), Bronze Award (Malaysia, 2021), Gold Medal (Beirut, 2021). Their certificate documents are in appendix.

III. CONCLUSION

Orthopedic shoes are specially designed shoes that provide support and pain relief for people suffering with some type of pain in the legs, ankles, or feet. The designed sole with lateral torque in this study can be help to patients for better and more comfort walking. In fact, it can be claimed that anyone suffering from any of the ailments (such as Swollen Feet - Lymphedema - Edema, Plantar Fasciitis - Heel Pain, Flat Feet - Fallen Arches, Bunions - Hallux Valgus, Hammertoes, Heel Spurs, Diabetes, Arthritis, those recovering from foot surgery) can greatly benefit from wearing orthopedic shoes with this insole.

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Appendix

A. Schematic of sole

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B. Romania, 2021

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C. Turkey, ISIF'21, 2021

CERTIFICATE

OF PARTICIPATION

ISIF'21 TURK PATENT

THIS CERTIFICATE IS PROUDLY PRESENTED TO

MEHDI FARZPOURMACHIANLALI FARZPOURMACHIANI ,SIMIN NAGHIBI MASOULEH ,PEIMAN JAMALI SAFSARI ,EBRAHIM MORAD POUR DEHKA,DAVOUD SIABI, AKBAR SHIRZADI MOTLAGH

FROM

TURKEY

showcased the invention

A MECHANISM FOR PREVENTING LATERAL TORQUE IN WALKING

at the 6th İstanbul International Inventions Fair ISIF'21
21st of September - 26th of September,2021

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TURKISH INVENTORS AND INNOVATORS

Innovation Title

A MECHANISM FOR PREVENTING LATERAL TORQUE IN WALKING.

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Ambassador of the Republic of Croatia in Malaysia

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E. Malaysia, 2021

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F. Malaysia, 2021

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G. Beirut, 2021

Gold Medal Certificate

The National Association for Science and Research
NASR

The organizer of the
2nd Beirut International Innovation Show – BIIS 2021

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Mehdi Farzpourmachiani - Simin Naghibi Masouleh - Ali Farzpourmachiani - Akbar Shirzadi Motlagh - Jalal Izadi Jorshari - Ahmad Rahmanzad Masouleh - Ebrahim Morad Pour Dehka - Davoud Siabi - Safoura Rajabi - Peiman Jamali Safsari - Amir Khodadadi Parashkouh - Saman Vadiat - Hossein Gholami Sabetghadam
From Turkish Inventors and Innovators Network - Turkey
For the Innovation
A mechanism for preventing lateral torque in walking.

Beirut, Lebanon
10 April 2021

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