ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 6 , June 2020

Effectiveness of Preventive Footwear at Redistribution of Soil Pressure of Foot in Patients with Diabetes Mellitus

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ABSTRACT: This article provides information on changes in the distribution of plantar foot pressure, the frequency of side effects and complications of preventive footwear, and analyzes the results of the effectiveness of providing preventive footwear for a contingent of patients with diabetes mellitus at the Endocrinological Dispensary of Bukhara Region (on the basis of selective questioning and dynamic observation of 50 patients).

KEYWORDS: diabetic foot, heel with bevel, removable shock-absorbing insole, deformation of joints, optimal design of orthopedic shoes, rational redistribution of load on the plantar surface of the foot;

I.INTRODUCTION

The study of the lower extremities of patients with diabetes mellitus, the biomechanics of the movements of the distribution of body weight on the support during the state and walking, the change in the size of the foot and hand during movement, the pressure arising between the foot and the upper shoe, will allow the designer to reasonably choose the size and shape of the upper and lower parts of the shoe, and also choose the right materials for parts [1].

II. SIGNIFICANCE OF THE SYSTEM

The area of human support is determined by the supporting surface of both feet. The greatest pressure is experienced by the bony protrusions of the calcaneus, the head of the metatarsal bones and the process of the fifth metatarsal bone.

However, thanks to the subcutaneous adipose tissue, the pressure on the supporting surface of the foot is distributed relatively evenly. Based on the average human mass and the average supporting surface of the foot, it is approximately believed that the average pressure of the foot on the support is about 0.05 MPa [2].

Studies have shown that complications of the diabetic foot of patients with diabetes, such as changes in bone structures, can cause locally increased plantar pressure. Repeated applications at such a high pressure of the leg become more susceptible to ulcer development [3].

Preventive footwear for patients with diabetes mellitus, in particular, makes it possible to lower pressure on the area of the plantar surface, for example, on those where pre-ulcerated conditions may already appear. Such shoes prevent horizontal friction on the soles, it does not squeeze the foot from above and from the side and does not injure the fingers with a hard top.

Therefore, in the physical model of the force interaction of the foot with the shoe with some approximation, the sheath plays the role of the upper shoe.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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III. LITERATURE SURVEY

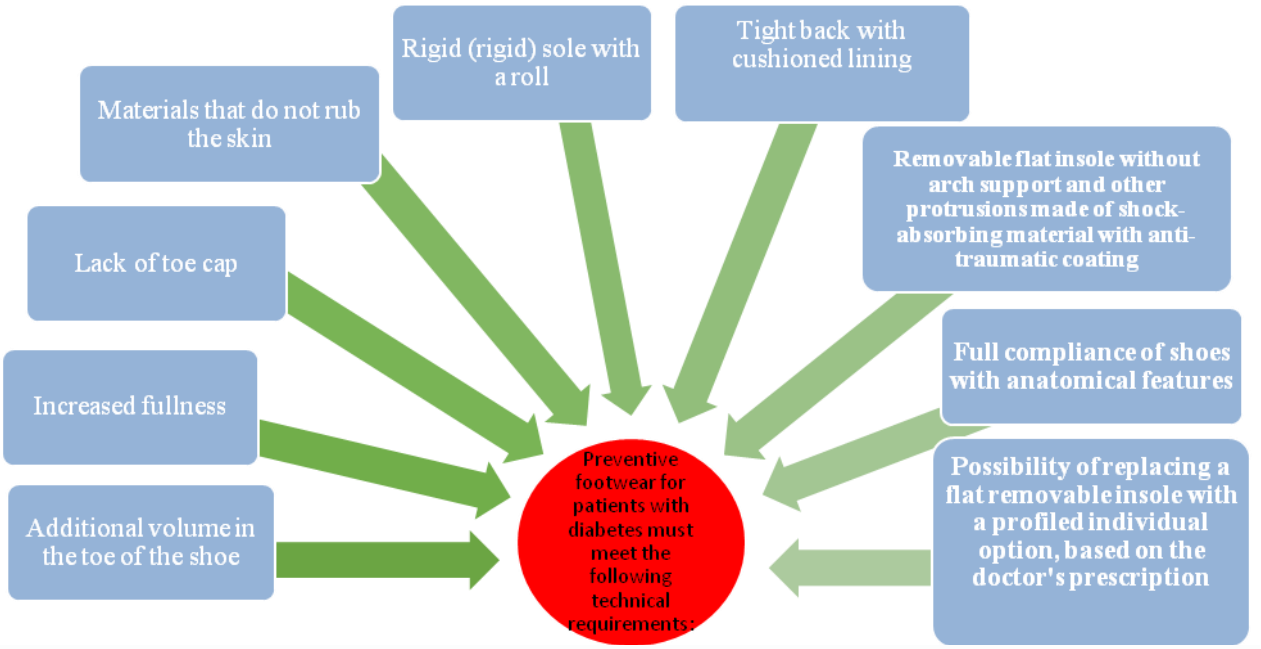
In accordance with the accepted physical model, it can be considered that when interacting with the foot, a force field arises in each elementary section of the shoe, determined by both external and internal factors. Under the action of forces, the details of the shoe press on the foot, as a result of which its soft tissues are compressed, and the details of the shoe are stretched and bent, which brings the force field into equilibrium. The pressure distribution of the shoe parts on the foot depends on the geometric and force interaction parameters taking into account the deformability of the soft tissues of the foot and the shoe parts [4,5].

Orthopedic shoes are designed to protect the feet from injuries, provide ventilation, comfort and convenience when worn. They are created using the same

R.R.Vreden and M.I.Kuslik were engaged in the development of a shoe design intended for the prevention of foot deformity and the construction of physiological shoes. OS Dobrova worked on the issues of rationalizing the pads for adults and children, both for the normal foot and for the foot with initial non-fixed deformations.

In our country, this problem was addressed by: A.A. Kaidarov, U.M. Maksudova, M.U. made a worthy contribution to the development of science to create a rational design of shoes.

technology and from certain materials with the following technical specifications:



Requirements for preventive footwear for patients with diabetes

V. EXPERIMENTAL RESULTS.

The definitions of the method of calculating the pressure on the plantar surface of the foot are of wide interest to researchers. Plantar pressure measurements are used to diagnose the problems of people with diabetes. The support of the foot in a standing position in statics and dynamics characterizes the change in pressure that leads to deformation of the soft tissue while standing or while walking the plantar pressure emphasizes the compression of soft tissues (skin, fat layer, ligaments and muscles) of the plantar surface of the foot.

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Table 1

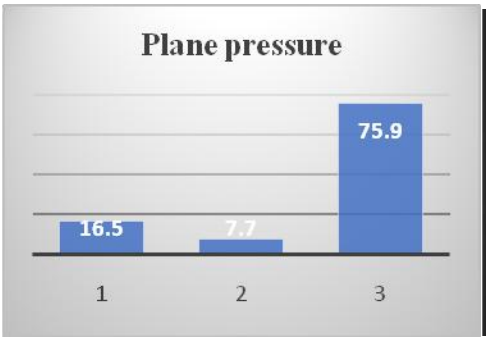
Shoe Parts	Sensor numbers	When resting on a plane	When relying on the insole material system
Over night beam part	1		
	2		
	3	16,5	22,4
Gelenny part	4		
	5		
	6	7,7	20,6
Heel part	7		
	8		
	9	75,9	57,5
	Total weight	76,04	100

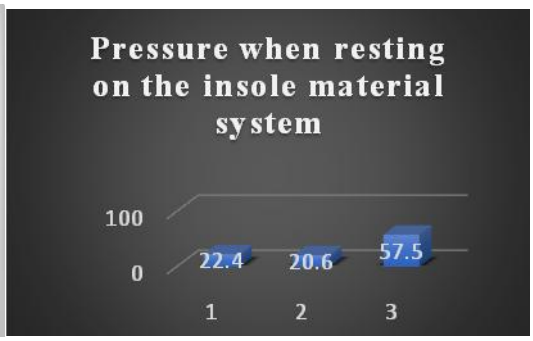
Plantar pressure study using a device with nine pressure sensors

Rational internal form depends on the following factors:

- anatomical structure of the foot;
- functional changes of the foot in statics and dynamics;
- uniform distribution of pressure on the back and plantar surface of the foot;
- morphological (age, pathological, etc.) changes in the foot.

50 patients with diabetes were examined. Questioning of patients on the use of shoes was carried out, the severity of foot deformities and the daily activity of patients were assessed. The volume dimensions of the front and middle sections, as well as the geometric parameters of the foot, were measured.





The effectiveness of stress reduction and the redistribution of two full contact insoles with various combinations of materials was compared with the efficiency of a conventional flat insole used as a basic condition.

When walking, one leg is a support, the other moves forward and lowers on the support with the heel, then rolls from the heel to the front and is repelled from the support by stoves and fingers. In the transition from the support of the entire surface of the foot to the support on the bundles, it bends in the metatarsophalangeal and tarsal joints. The heel support time is 7% of the entire support period, 43% for the entire foot, and -50% for the forefoot.

In the standing position, the balance is controlled by muscle action, which moves the distribution of plantar pressure by changing the rotation of the foot around the ankle (anteroposterior) and redistributing the total body weight to both legs (lateral). The force applied to the ankle compresses the foot. Compression naturally increases plantar pressure. In a standing position, perceived on the surface of two legs, corresponds to the force arising from the total body weight.

The above materials were based on work supported by the Ministry of Innovative Development of a research grant on the theme “Bukhara Engineering and Technology Institute.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 6 , June 2020

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