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Technical Requirements for Orthopedic Footwear for Diabetics

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ABSTRACT: To evaluate the use of orthopedic shoes in patients with diabetes with foot ulcersor previous minor amputations or Charcot arthropathy (CA) and factors influencing this use.

KEYWORDS: measuring insoles, risk of recurrence of trophic ulcers, irrational footwear, subgraph, decrease in sensitivity, therapeutic and preventive effects, internal form of footwear.

I.INTRODUCTION

The lesions of the lower extremities in patients with sugar diabetes concern doctors of various specialties. This is due to the fact that the violation of carbohydrate metabolism pits for changes in peripheral blood flow, innervation, the development of trophic ulcers, and in the scale of cases the need for limb amputation. The results of epidemiological studies conducted in different countries show that in the structure of all amputations of lower extremities of non-traumatic character, patients with diabetes have a diabetes of 50-75%. The frequency of amputation depends on the age of the patients, duration of the disease, type of diabetes. In elderly people there is a high incidence of diabetic foot syndrome with a tendency to generalize the inflammatory process and development of gangrene, which results in a greater number of large-volume amputations. The frequency of development of the diabetic foot syndrome correlates with the duration of the course of the underlying disease. Diabetes mellitus and its complications are one of the leading causes of disability and mortality of the population, including the able-bodied age. According to researchers, around 12% of the total health budget is spent on this disease worldwide.

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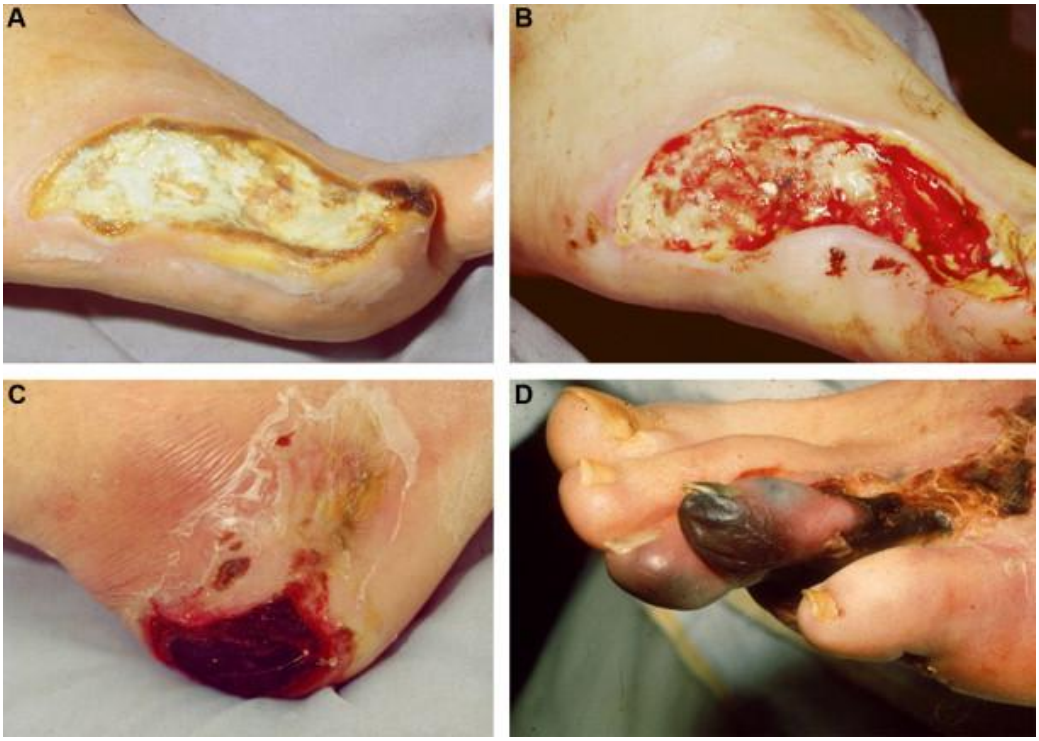

Fig.1.
Ischemic lesions. A. Ischemic ulcer. B. Ischemic ulcer after revascularization. D. Heel sore. C. Toe necrosis.

The study of the lower extremities of patients with diabetes mellitus biomechanics of the movements of the distribution of body weight to the support in the state and walking, the change in the size of the foot and hand during movement, the pressure arising between the foot and the top of the shoes will allow the designer to approach the choice of the sizes and shapes of the details of the top and bottom of the shoes, and also to choose the right materials for details.

A firm scientific basis for constructing a dimensional typology, which is the main development of dimensional assortments, can provide only extensive and systematic anthropometric data on the dimensions of a person's limbs. In the systematization of knowledge of the size of a large role assigned to the development of programs of anthropometric surveys and processing of data by mathematical statistics.

II. SIGNIFICANCE OF THE SYSTEM

Rational is considered to be shoes, which creates maximum comfort for the foot in the process of its work. Supplying the population with rational footwear is of great importance, since such shoes reduce fatigue of the organism, prevent the development of leg diseases, improve the general condition of a person and increase his working capacity.

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Figure.2.Managing diabetic foot infections

One of the main elements of the elements of the rational design of shoes is its internal form, which is determined mainly by the size, shape and work of the foot.

The specifics of designing shoes for preventive footwear are determined by the following factors:
- Features of the morphology of the feet, characteristic of various groups of the disease of the diabetic foot syndrome, as well as differences in the typology of deformities of
the feet;
The process of designing shoes for preventive footwear, taking into account the above factors, includes the following stages of work:
- analysis of the parameters of the current shoe pads for this type of disease;
-development of technical specifications for the design of the shoe of a certain type and purpose;
-conducting anthropometric examination of the feet of the group of diabetic foot syndrome, identifying patients' requirements for footwear for this type of disease;
-processing of anthropometric footstep data, graphical representation of the conditional mid-term foot of patients;
-define the basic parameters for the design of the shoe;
-Development of the first draft of the shoe;
-Preparation and testing of the prototype pads of orthopedic shoes for patients with diabetes mellitus.

III. LITERATURE SURVEY

When designing rational designs of shoes and shoes, it is necessary to take into account the shape and dimensions of the foot not only in the static state, but also in the process of work. With a uniform distribution of the load on both human stops, the vertical, lowered from the center of gravity of the body, pass approximately through the middle of the pivot between the stops.

The area of the person's support is determined by the support surface of both feet. The greatest pressure is experienced by the bony protuberances of the calcaneus, the head of metatarsal bone and the process of the fifth metatarsal bone. However,

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thanks to subcutaneous adipose tissue, the pressure on the foot support surface is distributed relatively evenly. Based on the average mass of the person and the middle support surface of the foot, it is approximately believed that the average pressure of the foot on the support is about 0.05 MPa. When the heel part of the foot is raised on the
heel, the pressure on the front of the foot increases. For the physiological balance of the muscles, it is necessary to lift the heel part of the foot by 1/14 of its length.

When walking, one leg is a support, the other moves forward and falls on the support with a heel, then rolls from the heel to the front and pushes away from the support with stoves and fingers. When moving from the support of the entire surface
of the foot to the support of the bundles, it bends in the metatarsophalangeal and tarsal articulations. The time of support on the heel is 7% of the entire reference period, the entire stop-43%, the front of the foot -50%. In connection with this, it may be useful to develop a design of orthopedic footwear for patients with diabetic foot syndrome.

IV. METHODOLOGY

One hundred twenty-one patients with diabetes (55 men and 66 women; 36 in the inactive stage of CA) were included. A questionnaire based on footwear was used to evaluate patients' compliance. Daily activity and the severity of the foot deformities were recorded. Further, foot geometry and forefoot and midfoot circumferences were measured. Results. Fifty-eight patients did not use orthopedic shoes. Users and non-users did not differ in terms of gender and type of diabetes. The causes of refusal included ill-fitting shoes (56%), ugly appearance (11%), traumatisation with shoes (11%), inability to walk (5%) and other causes (17%). The percentages of patients in each category of deformity severity were mild (41.2%), moderate (37%) and severe (54%. Frequency of refusal of CA vs non-CA patients: 72.2% and 43.5%; with severe deformities,70.8% vs 34%; with moderate deformities, 83.3% vs 57.2% ($p < 0.05$ for all). In patients with CA, the only significant parameter was the difference in the circumference of the midfoot between the affected and non-affected foot; in CA users and non-users, this parameter was 1.93 ± 1.25 vs 0.70 ± 0.83 cm, respectively ($p = 0.01$). Conclusions. The high frequency of refusing to wear orthopedic shoes is related to severe foot deformities and the inability to accommodate them in off-the-shelf footwear. Most of the patients used orthopedic shoes for outdoor use, but the frequency of use was low. Shoe compliance did not depend on gender but increased with ageing, low levels of daily activity and in patients with severe deformities. Patients with CA are characterized with extremely low compliance. In this group, foot parameters and other objective parameters did not rely on footwear compliance.

V. EXPERIMENTAL RESULTS

According to the data of a randomized clinical trial, the risk of relapse of trophic ulcers decreased by 45% for 1 year of wearing "shoe by ready-made shoe". Qualitative orthopedic footwear significantly (by 2-3 times) reduces the risk of diabetic foot syndrome - that is, it has a more effective preventive effect than most drugs prescribed for this purpose.

The prophylactic effect of orthopedic footwear has been proven in studies involving high-risk patients (history of trophic ulcers), but has not been confirmed in low-risk groups. Table 2 provides comparative indicators of the use of orthopedic shoes. In the recommended design, almost no complaints and pain in the process of wearing shoes.

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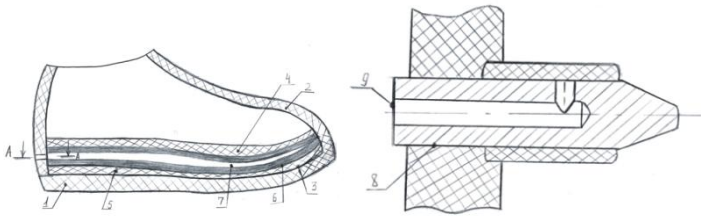
Table 1.
Indices of use of orthopaedic footwear

	Number of complaints on everyday and pain shoe brushes	
	In a week	Within a month
Footwear	12	37
Recommended shoes	-	2

At the same time, patients did not complain about injuries and pain in their feet. The design allows the uniformity of the load across the entire surface of the foot. The design can be used for all kinds of shoes.



A-A
Increased

Figure.3. Orthopedic shoes for patients with diabetes mellitus

REFERENCES

1.Chentsova K.I. Stop and rational shoes. - Moscow: Light Industry, 2000
2. Gurdjian A.S. Preventive footwear for diabetics / A.C. Gurdjian, S.P. Aleksandrov.
3. Kaspar // Vestn. guild prosthetic orthopedists. 2002. - №2 (8).
4. Dedov I.I. diabetic foot syndrome: clinical features, diagnosis, treatment and prevention / I.I.Dedov, M.B.Antsiferov.
5.Petrova NL, Moniz C, Elias DA, et al. Is there a systemic inflammatory response in the sharcarot foot? DiabetesCare. 2007; 30 (4): 997-998. doi: 10.2337 / dc06-2168.