

Commodity analysis of compression products for varicose veins

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Abstract

Compression therapy occupies a key place in the complex treatment and prevention of chronic venous insufficiency of the lower extremities. Today the pharmaceutical market of Ukraine is represented by a wide range of compression products. Popular in Ukraine are manufacturers of compression products from the Baltic region, Ukraine, there are also Russian, but leading in quality are Germany, USA, and Italy. A survey of consumers and pharmacy practitioners has been performed. The results obtained indicate that compression products for varicose veins treatment are inferior to medicinal products in sales. The main motive for buying a compression product is a doctor's prescription. The most popular compression garments are stockings.

Keywords

commodity analysis, compression products, consumer properties, medical knitwear

Introduction

Concern for the health of the population is one of the main tasks of our state. Unfortunately, the difficulties associated with the diagnosis and prevention of certain diseases, as well as the treatment of patients, lead to huge losses and become an extremely important socio-economic problem of society. One such dangerous disease is chronic venous insufficiency (CVI), which occurs due to complications of blood flow from the veins of the lower extremities, usually associated with varicose veins, or is a consequence of deep vein thrombosis of the lower extremities (Siroiyd et al 2012; Lukiyyenko et al. 2014). CVI is an extremely common pathology, which in developed countries affects 22–45% of the population over the age of 30, with the number of new cases constantly increasing (Perryn 2008; Vakhration 2008; Yakubonis 2010). In Ukraine, this disease is found in approximately 17% of the population (Kvitchata et al.

2014). Not to mention that CVI is a dangerous disease, its presence in a human significantly impairs the quality of life (Yakubonis 2010). Therefore, it is extremely important to study the availability on the domestic pharmaceutical market of a range of compression products from different manufacturers with different price characteristics, which have certain differences and specific conditions of use, as well as to determine their feasibility under certain conditions, which should increase the effectiveness of CVI prevention and treatment (Pertsev 2007; Głowiczki 2009; Lukiyyenko et al. 2014).

After the invention of rubber vulcanization, doctors began to use materials that possess elasticity, such as elastic bandages. However, a fundamentally new era in the history of compression therapy has begun when compression knitwear was created (Diadiun and Baranova 2020).

Compression garments are special clothing containing elastomeric fibers and yarns used to apply substantial

mechanical pressure on the surface of needed body zones for stabilizing, compressing, and supporting underlying tissues (McRae et al. 2011). They have been widely researched and utilized in the fields of medical applications, athletic applications, and body-shaping applications (Wang et al. 2011). Medical compression garments are divided into two types: preventive and curative. Preventive knitwear is marked in dens and usually has compression not more than 18 mmHg. It is used to prevent venous insufficiency in healthy people who are at risk. Therapeutic knitwear is selected on a compression class and demands size selection according to anatomic measurements. The fundamental difference between a compression garment and the same elastic bandages is that it has a given pressure, which is programmed by computers in production. For example, medical knitwear of the first class of compression is usually used for the prevention of varicose veins, including during pregnancy, for the prevention of venous thrombosis in bedridden patients; it can be chosen without a prescription, and, for example, the fourth class of compression is used in severe pathologies. Therapeutic compression garments of II, III, and IV classes of compression should be prescribed by a phlebologist. Proper pressure distribution is very important for medical compression knitwear. The pressure on the ankles (preferably in the ankle area), which divides the knitwear into compression classes, is taken as 100%. Proper garments should have 70% of this pressure at the level of the shin and 40% at the level of the thigh. This pressure gradient restores proper blood flow in the veins (Diadiun and Baranova 2020).

The main purpose of this work was to study the consumer properties of compression products, to study the market and the range parameters of the compression knitted medical products, to which increased requirements during operation are put.

Materials and methods.

Frequency and descriptive analysis. In the course of the work, the classes and types of compression products have been studied, the market of products that can create the effect of compression on the human body has been analyzed.

By definition (Bilych 2001) therapeutic and prophylactic products are medical products, used to preserve and strengthen human health, as well as an adjunct in the treatment of diseases. According to Order No. 753 of the CMU (2013) "medical device" is any tool, apparatus, device, software, material, or other product used either individually or in combination with each other, intended by the manufacturer to provide diagnostics, prevention, monitoring, treatment, or alleviation of the patient's condition and the course of illness in case of disease, injury or disability or their compensation. Order No. 753 (2013) states that attribution of medical devices to a particular class is based on the intended purpose of the medical device and the vulnerability of the human body, taking into account the potential risks associated with the development and manufacture

of these devices, and is carried out using the criteria and classification rules defined by DSTU 4388: 2005 "Medical products. Classification depending on the potential risk of use. General requirements". It should be noted that knitted medical products belong to the group of products that are in direct contact with the surface of the human body.

The medical garment has a very wide range of applications. The variety of medical elastic fixing and compression products is quite large. According to State Standard P 51219-98 (1998), they are divided into five groups: elastic bands, elastic bandages, bandages for fixing joints, compression garments, highly elastic compression hosiery (Melnik et al. 2015). Of most practical interest is knitwear that has become incredibly popular today due to its availability and ease of use, namely – compression hosiery products with therapeutic or prophylactic effect.

The term "compression products" is used in medicine to refer to products that can create a compression effect on the human body. According to State Standard P 51219-98 (1998) and State Standard P 58236-2018 (2018) compression is a process that creates a physical effect (pressure) on human organs and tissues through an elastic product (Melnik et al. 2015). Elastic products are products that are able to withstand external deforming forces, restoring their original size when the load is removed, and also have an elongation value of more than 500%.

Each compression class is a dosed pressure on the venous walls of a certain part of the human body, i.e., it is a characteristic of the compression (pressure) degree provided by the elastic product on the patient's body. Most often, manufacturers use the German standard RAL-GZ 387/1, which sets the pressure in the ankle and its distribution along the product.

The group of compression medical devices has several requirements set to, the compliance of which is mandatory to obtain the desired therapeutic effect, such as the correct physiological distribution of pressure, shape resistance, wear resistance, and stability in different conditions of use. (Melnik et al. 2015).

Results and discussion

Today on the market of Ukraine a large number of various models is presented. They differ in external parameters, composition, and, of course, class. As for the external parameters, it is possible to choose different densities and colors of the product. The products include various types of cotton and nylon fibers, a certain percentage of lycra, as well as microfiber.

By purpose, compression stockings are divided into classes: class 1 – pressure up to 23 mmHg. – for the prevention and at initial signs of varicose veins; class 2 – pressure up to 33 mm mercury – in the middle stage of varicose veins and thrombophlebitis; class 3 – pressure up to 45 mm Hg. – for patients with severe venous insufficiency; class 4 – pressure above 45 mm Hg. – to restore lymph flow. There is also preventive compression knitwear, with

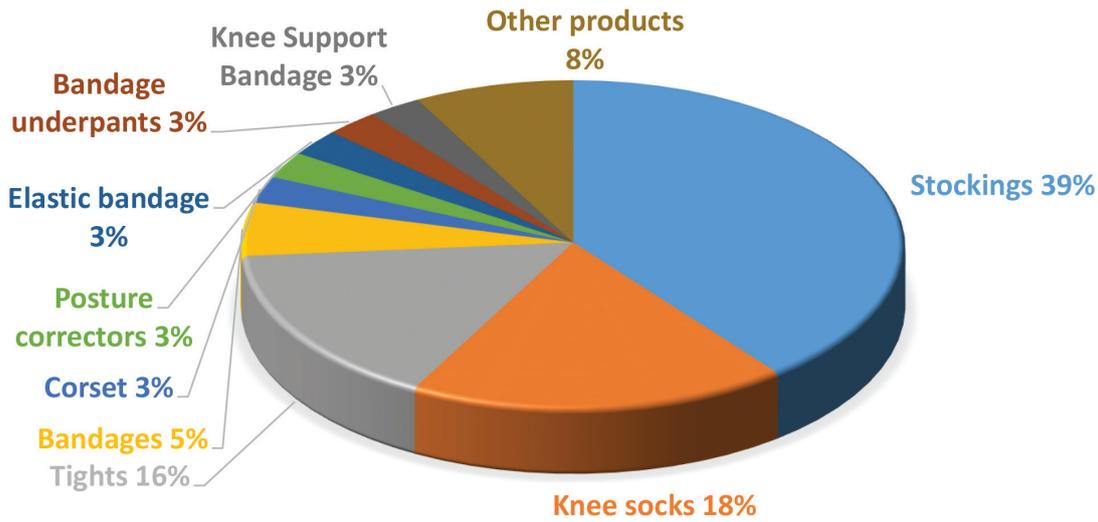


Figure 1. Frequency analysis of the types of compression products.

pressure under 18 mmHg. This value may vary depending on the manufacturer. To choose the right type, a doctor’s recommendation must be followed. And he prescribes not the density of stockings, but their class. The product packaging must contain a transcript of classes by density. This will help to choose the right pair.

The difference between compression models and classic ones is that the pressure on the limbs is from bottom to top, not the opposite. The shins are subjected to maximum compression, and the thigh has about 40% pressure. It is also important to know that the end of the product must be above the affected area by 15–20 centimeters. The lower the affected area is located, the more difficult it is to ensure proper blood flow, respectively, the more effort is required. Compression stockings’ height can be up to the middle of the thigh or the entire thigh. There are also summer models with an open toe.

It has been found that today the pharmaceutical market of Ukraine is represented by a wide range of compression products. Of 38 types of compression products stockings are 15 types (39%), knee-socks are 7 (18%) and tights are 6 (16%) (Fig. 1).

To date, the pharmaceutical market has a very large number of companies that manufacture compression knitwear (Table 1.). The Ukrainian market presents compression products of both domestic and European manu-

facturers of different price categories. Popular in Ukraine are manufacturers of compression products from the Baltic region, Ukraine, there are also Russian, but leading in quality are Germany, USA, and Italy; their products are characterized by a balanced combination of medical feasibility, functionality, and aesthetics, which is very important in such diseases. They use a variety of colors – white, nude, black, and others. To Ukraine, they supply classic and improved models of women’s and men’s compression stockings, as well as compression garments for pregnant, hospital garments, compression sleeves, and gloves. Each company is trying to win its place in the market, attract more consumers, creating unique models, but all of them are aimed at therapeutic action.

Among the world’s best manufacturers of compression knee socks, stockings and tights are the following companies: (Yakubonis 2010).

According to the results of the comparison, it is possible to draw the following conclusion. In their products, manufacturers adhere to the required composition and in almost all products it is the same. But, depending on the class of compression stockings, the material ratio may vary.

At the next stage of our research, a survey of consumers was conducted. 100 consumers were interviewed, but some of the questionnaires were rejected, so 87 questionnaires were selected for research. The vast majority of respondents are people aged 18–30 with unfinished higher education.

At this stage of the study, the motivation to buy compression products has been studied.

The results of the survey in Fig. 2 showed that 76% of buyers are motivated to buy compression products by a doctor’s prescription, 22% – by the need to prevent varicose veins, 2% – by the pharmacist’s recommendations. Data analysis suggests that pragmatic motives predominate in choice.

The next step in the study was to determine the sales of compression products compared to pharmaceutical products.

Table 1. Manufacturers of compression products in the market of Ukraine.

Company name	Country	Composition
1. TONUS ELAST	Latvia	Polyamide – 80%; Lycra – 20%.
2. Mediven (Medi)	Germany	• elastane – 31%, • polyamide – 69%.
3. Relaxsan	Italy	composition of microfiber – elastane – 21%, polyamide – 79%;
4. Soloventex	Ukraine	Polyamide, elastane, cotton.
5. Veinax	France	polyamide – 70%, elastane – 30%
6. Tiana	Italy	polyamide – 73%, lycra – 27%.
7. VENOTEKS	USA	Nylon – 75%, elastane – 25%

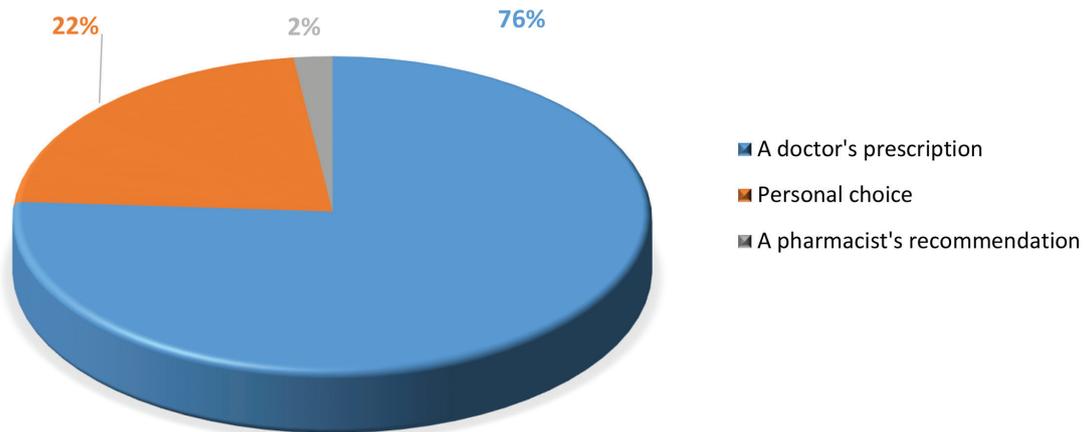


Figure 2. The distribution of motives to buy a compression product.

A survey was conducted for specialists in the pharmaceutical industry, which were presented by the following groups: interns, work experience of up to 1 year; specialists, work experience 1–5 years; specialists, work experience 5–10 years; Specialists with more than 10 years of work experience. A total of 78 respondents have been interviewed. Part of the questionnaires was rejected due to incompleteness. Therefore, 73 questionnaires were used for further analysis.

The results of the survey of specialists have shown that compression products account for 20% of the tools for the prevention and treatment of varicose veins, while pharmaceuticals account for 80%. The survey also showed that consumers prefer drugs in solid dosage form 82%, as compared to semisolid dosage forms 18%. Such a result may be due to the relatively high cost of compression products compared to pharmaceutical products for varicose veins and the lack of reimbursement of medical devices in Ukraine.

The collection of personal information was carried out considering ethical requirements when working with people under the Helsinki Declaration (World Medical Association Declaration of Helsinki, Ethical Principles for Medical Research Involving Human Subjects). All study participants agreed to an anonymous questionnaire. The conclusion about statistical hypotheses was made at the level of significance $p \leq 0.05$. The survey was attended by people from different networks and private enterprises of Ukraine, from the following cities: Kharkiv, Poltava, Kyiv, Dnipro, Chernihiv, Lviv.

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Conclusions

1. Compression therapy in the complex treatment and prevention of chronic venous insufficiency of the lower extremities occupies a key place. It is recommended for any degree of venous insufficiency, regardless of the cause.
2. It has been established that there are 38 commodity types of compression products on the pharmaceutical market, of which stockings account for 15 items, socks – 7, tights – 6. Thus, as a result of frequency analysis of compression products market, it has been established that in the Ukrainian market stockings are leading (39%), the second place was shared by knee socks (18%) and tights (16%), other compression products are 27%.
3. The second stage of the study was the identification of motives for buying compression products. The results of the survey have found that 76% of buyers are motivated to buy compression products by a doctor's prescription, 22% – by the need to prevent varicose veins, 2% – by the recommendations of a pharmacist. Analysis of the data suggests that pragmatic motives prevail in the choice.
4. It was also determined that compression products make up 20% of the tools for prevention and treatment of varicose veins, while pharmaceuticals make up 80%. The survey also showed that consumers prefer medicines in solid dosage form 82%, compared to semisolids 18%.

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