THE INVESTIGATION OF COMPRESSION HOSIERY

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ABSTRACT

Numerous studies around the world emphasize the unconditional impact of compression therapy as prevention of varicose veins, of trophic ulcers healing and other problems. Therefore, the development of new knitted materials for prevention and rehabilitation of anatomical forms and functions of the human body is an important issue as for medicians as for textile researchers.
The purpose of this research work is to study the structure parameters and the properties of compression hosiery for compliance with the standard requirements and for providing the necessary therapeutic effect. The compression stockings for women have been produced on circular knitting machine «Lonati» (Italy) with a special supply for elastomeric yarn. The single backed weft knitting have been chosen for stocking manufacturing. Researches of structures parameters and deformation characteristics of stretch fabric, as well as an influence of wet-heat treatments on the properties of compression hosiery have been carried out. The investigation of structure parameters and physical and mechanical properties of compression hosiery is establishing their conformity to the standard.

Key words: elastomeric yarn, compression hosiery, structure parameters, deformation characteristics, weft knitting, single backed interlooping

INTRODUCTION

Medical textile is a wide segment of the textile market due to the widespread need in them, not only in hospitals but also in everyday life, as the product for hygiene, disease prevention and the postoperative recovery period. Assortment of medical textile products is very miscellaneous.

Particular attention is drawn to medical elastic products for fixing and for compression due to their high demand. These products are divided by design into five groups: elastic bandages, elastic supporting bandages, bandages for joints fixation, compression garments, highly compression hosiery [GOST R 51219–98]. However, despite a variety of medical textile, compression hosiery for therapeutic and prophylactic using has become incredibly popular today because of its accessibility and ease using. That is why; compression hosiery is the most interesting now as for patients and for medical personal as well as for textile researchers.

The compression therapy is a basis of any treatment of varicose veins. It is now recognized that the prevention and treatment of disease through the using of compression underwear, is the only reasonable, safe method. The aim of the use of compression bandage is the reduction of venous hypertension, which results from valvular insufficiency. The application of external compression by means of a bandage serves to increase the velocity of blood flow within the veins by providing support to the muscles.

Due to the fact that medical textiles influence directly on human health, it is necessary to ensure the requirements for such products during the manufacture process. Therefore, the authors focus on the research of parameters and properties of compression hosiery and the establishing their conformity to the standards.

THEORY

End-using of compression textile products requires strict adherence to hygienic, physical and mechanical requirements. This creates the limitations in the choosing of the raw materials and of the interlooping, in design methods of structure parameters and physic-mechanical properties of knitted fabrics. Following most important requirements should be taken in account during developing the

recommended 15 N by standard for all three compression levels for both parts of women's stocking of size 4 (table 2). The same trend is kept for specimens of knitted fabric after wet-heat treatment.

The experimental values of elasticity (table 2) of compression stocking on the ankle and on the lower leg show that elongation is decreasing with increasing of compression level. The obtained values of full stretch correspond the standard both before and after wet-heat treatment of knitted product.

The intensity and degree of sizes recovery of elastic fabric after the tensile force removal depend on the elasticity, on the deformation degree and on the thickness of knitted fabric as well as on the method of elastomeric yarn fixing in knitted structure and on the yarn elasticity. Herewith the strain relaxation of elastomeric yarn is a crucial factor in the determining the degree of the recovering process. The residual stretch cousewise is in the 10% range; moreover, the best value is shown by stocking of compression level III (table 2). it can be explained by the fact that knitted fabric of compression level I is more stretched than knitted fabric of compression level III at the same load. Therefore, the process of recovering the structure is longer. It should be noted that the value of parameter is significantly reduced after wet-heat treatment.

Altogether, the physical and mechanical properties of compression hosiery correspond the standard, and wet-heat treatment does not affect the therapeutic effect.

CONCLUSION

The carried out investigation of structure parameters and physical and mechanical properties of compression hosiery is establishing their conformity to the standard for the following parameters: changing of linear dimensions products after wet-heat treatments is within 5% and does not affect the physiotherapeutic properties of compression hosiery; residual part of full stretch of products does not exceed 10% that is regulated; values of tensile strength and elasticity of the products correspond to the standardized value.
It was found that exposure of wet-heat treatments on the properties of compression hosiery is not significant. The experimental results show that differences in knitted fabrics properties before and after WHT are within the allowable error. This means that the wet-heat treatment of compression hosiery does not affect the therapeutic effect.

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