

## Supervisor's opinion - recommendation

Supervisor: Ing. Brigita KOLČAVOVÁ SIRKOVÁ, Ph.D.

Dissertation title: Structure and Analysis of Woven Compression Bandages for Venous Leg Ulcers

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Woven and knitted fabric structures in the category of compression bandages are used in healthcare as a basic way of compression treatment for patients suffering from varicose vein problems. The bandage prevents and slows down the progression of chronic venous disease. The presented thesis entitled: Structure and Analysis of Woven Compression Bandages for Venous Leg Ulcers was focused on the study of the structure as well as the behaviour of woven compression bandages. The priority group of work is short-stretch bandage. These bandages are the most effective and healthiest for the treatment of diseases of the venous system, especially leg ulcers of venous origin.

The basis of the thesis was: the study of compression woven bandages, their construction, structure and properties. The aims of the study are divided into three basic parts:

### 1) Analysis and modification of input yarns for short-stretch woven compression bandages

Final elasticity of short-stretch cotton compression bandages depend on the construction parameters of the input cotton yarn. The specific number of twist in the input twisted yarn, after finishing of raw woven bandage with a hot bath without tensile stress, creates the elasticity of the bandage.

### 2) Analysis and modification of a short-stretch compression bandage

The study of woven compression bandages is a current and wide topic. From the point of view of publication contributions, the issue of structure is described in a minimal way. During the application of the textile bandage, the degree of compression achievement is only estimated on the basis of the personal experience of the bandage applicator (medical staff or the patient himself). The study of the structure subsequently enables the modification of the bandage from the user's point of view. It is an effort to produce a bandage with information, so-called integrated tension sensor, which will facilitate and allow the correct application of the bandage with right compression. The study is focused on description of the relationships between the construction and structure of the woven bandage and the behaviour of the bandage under stress. Development of methodology for evaluation of the structure of woven bandage in relation to stress and evaluation of the structure versus the resulting compression of the bandage in its use.

3) Study of basic relationships between bandage structure and bandage behavior during the stress (structure versus compression)

The basis of this part is the monitoring of compression (pressure) during winding of the bandage. When the bandage is wound, the structure opens. For identification of the changes in woven fabric structure it is possible to use a thread mark in the form of a rectangular mesh (rectangles) which is inserted into the structure of the bandage during weaving. The study of the compression provides guidance how it is necessary to extend the side of the rectangle in the longitudinal axis to ensure the required compression when applying the bandage. A change in the distance of two coloured wefts in the woven bandage at a given tension will inform about the pressure (compression).

The topic of the thesis is current. Thematically, it focuses on the issue of the textile structures for compression therapy. Compression therapy helps in the prevention and treatment of venous leg ulcers, lymphedema and musculoskeletal disorders. I appreciate the student's approach to the issue, where the approach was positive with great work commitment. The proposed solutions of individual thesis parts were based on the possibilities and knowledge of the student. The elaboration and description in some places lacks the deeper theoretical reflection that is expected from a doctoral student.

In my opinion, the idea of this work can be considered to be beneficial and very useful in the future. The student showed diligence in the preparation of the work and also achieved good formal levels of the submitted work.

I can recommend the work for the defence and based on a successful defence to give degree Ph.D. to a student Abdelhameid Rajab Ramadan ABOALASAAD.

Liberec 16.2.2021

Ing. Brigita KOLČAVOVÁ SÍRKOVÁ, Ph.D.

