

University of Medicine and Pharmacy, Târgu-Mureș, România
Faculty of Pharmacy
School of Doctoral Studies
Department of Pharmacognosy, Phytochemistry and Phytotherapy

Scientific supervisor:
Prof. Emeritus Dr. Carol Csedö

PhD Candidate:
Pharm. Floriana Monica Rusu

Phytochemical Study of Various Sorts of Castor Oil (*Ricini oleum*) in dermatological products

Abstract of the Doctoral Thesis

The aim of this thesis was to obtain a dermato-cosmetic product containing Castor Oil which can be successfully used in the treatment of hair growth and regeneration. The thesis is structured into 2 big parts: a general part and an experimental part.

In the general part of the thesis (Chapters 1, 2 and 3) there are summarized the data from the specialized literature regarding the botanical characteristics of the Castor plant (*Ricinus communis*), agricultural aspects, general composition of the Castor Oil and its uses.

In the experimental part of the research (Chapters 4, 5, 6, 7 and 8) there are presented the data obtained from the research undergone in the period between 2004-2008 regarding the cultivation of the Castor plant, the analysis of the Castor Oil and the preparation of a pharmaceutical product.

Chapter 1 describes the botanical characteristics of the Castor plant (*Ricinus communis*) and the cultivation conditions needed for this plant. As it prefers the warm areas to grow and reach maturity, the Castor plant has been historically cultivated in the southern part of Romania. Officially, in Romania the Castor plant is not cultivated anymore for technical purposes, but only for ornamental ones.

In **Chapter 2** we have presented the literature data concerning the methods of obtaining the Castor oil (*Ricini oleum*) and physical and chemical properties of this oil. Besides that, the chemical composition of the Castor Oil (*Ricini oleum*) is presented, as described in the scientific literature. The most important and valuable ingredient of the Castor Oil is the ricinoleic acid, which can be present up to 90% and which offers the oil very specific and unique characteristics.

The end of the general part, the **Chapter 3** presents the multiple uses of the Castor Oil (*Ricini oleum*). It is estimated that Castor Oil has over 200 uses where it cannot be replaced or where the quality of the products is outstanding compared to other oils. Besides the industrial areas where the oil is used, traditional uses in medicine have brought up the subject of this thesis, meaning the use as hair regenerator.

The experimental part, begins with **Chapter 4** where our research and work in the cultivation of the Castor plant in Romania is described. During our experiment we have tried and successfully managed to cultivate the plant also in the central part of the country. The varieties we have used were *Ricinus communis* L. *Vlașca* and *Ricinus*

communis L. *Sanguineus* 401. We have cultivated both varieties in The Ciuc region and also in Transilvania. The results obtained were comparable to the data mentioned in the literature.

Chapter 5 presents the gas-chromatography analysis we have conducted on 11 samples of Castor Oil (*Ricini oleum*). The 11 samples came from different areas all over the world. We have used a Carlo Erba Fractovap gas-chromatograph, with an Omegawax column. The results showed a slight similar composition in fatty acids of the samples we have tested. Based on the results and on the fact that we needed an oil that is easy to be purchased locally in Romania, we have selected the oil contained in sample no. 11 to be the one used further on in our research.

In **Chapter 6** there are presented the two formulations we have considered for the preparation of a lotion for external use containing Castor Oil. One formulation contained: Castor Oil 35,00 g, Lanoline, Cetylic acid, Span 60, Tween 80 and Purified Water. The second formulation contained: Castor Oil 40,00 g, Span 60, Tween 60, Purified Water. Both formulations have been described by the scientific literature. Before starting to prepare the lotions, the Castor Oil we were planning to use has been analyzed for quality compliance by the National Medicines Agency in Romania. Once the two formulations have been prepared, another set of quality and stability check has been performed.

Chapter 7 describes the non-clinical and clinical experience we have conducted. The non-clinical experience was conducted on 20 rabbits, part of them being treated with the lotion 35%, part of them with the lotion 40% and part of them were considered as "blank". The treatment was applied on a daily basis on the study area (back or abdomen) previously shaved. The duration of the treatment was of 35 days after which the thickness and length of the new hair was measured. The results were very good for the lotion 35% where the length and the thickness of the new hair was significantly increased and not at all satisfactory for the lotion 40% where the new hair had difficulties in growing and was weak and thinner then previously. Considering this, we have selected the lotion 35% to be the one used during the clinical experience.

The clinical experience was conducted on 24 patients suffering from hair loss, divided into 2 arms. The treatment was applied on a 2-day basis, during 2 months. The results we have obtained were very good in the majority of patients, no adverse reactions have been reported. Based on the results obtained and the composition it is clear that this product acts as a general tonifier for the hair follicle and it is suitable to be used in the treatment of alopecia, even under stress conditions.

The last chapter of the thesis, **Chapter 8** is presented as a registration file for a medicinal product, structured exactly as the ones submitted to the National Medicines Agency for marketing authorization. Due to the fact that our product was prepared on a laboratory scale and only for the experimental purposes of this thesis, the registration file is abbreviated. The product has been registered at the National Office for Marks and Inventions (OSIM) Romania under the tradename ***RicinOil M*** ®.

Through the varied and complex approach of the researched theme, the thesis makes many contributions to the elucidation of the great source of valuable compounds we can find in plants. Phytotherapy will never replace the real scientific-based medicine, but will always be part of it by offering possibilities of complementary or adjuvant treatment in certain situations.