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Formulation and testing of the physical stability and *in vivo* efficiency of creams for skin application containing black goji berries extract

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Introduction: Black goji berries, *Lycium ruthenicum* Murr., have proven medicinal properties that came from present secondary metabolites. Due to their positive effects, they can be used in skin treatment. Creams were used as a base because of the good feeling they leave on the skin and their good appearance. In order to select the optimal formulation, it is necessary to examine the physical, chemical and microbiological stability.

The aim: The aim of the study is to formulate and test the physical stability of creams containing black goji berries extract, and then conduct *in vivo* efficiency testing on the skin of healthy volunteers.

Material and Methods: During the study, four active creams were formulated, two lipophilic with Abil EM[®]90 and two hydrophilic with glycerol-monostearate SE as emulsifiers. Creams containing glycerol-monostearate SE, were not used for further testing because of phase separation. The examined parameters to assess physical stability included: electrical conductivity, phase separation and pH. For *in vivo* efficiency testing, due to better organoleptic properties, just one active cream was used. The examined parameters included: transepidermal water loss, erythema index, friction, hydration and pH.

Results: The tested creams retained their characteristic odour and homogeneous appearance, with a colour changing to pink. The electrical conductivity was 0.0 $\mu\text{s}/\text{cm}$, no phase separation was observed during centrifugation, while there was a difference between the initial pH values and those measured later ($p \leq 0.05$). No significant difference was observed in the efficiency parameters compared to placebo cream and untreated skin ($p > 0.05$). The friction showed an increase after 7 and 14 days of application compared to the basal value ($p \leq 0.05$).

Conclusion: Both creams showed physical stability except for a slight discoloration. Although the test cream showed some effects, a study on diseased skin would provide much better insight into the potential effects of cream.

