Is sclareol, the active ingredient in clary sage oil used for menopausal symptoms, absorbed transdermally?

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【Objective】

During menopause, estrogen levels in the blood fluctuate, causing menopausal symptoms. Although hormone therapy effectively treats menopausal symptoms, it is associated with adverse effects such as venous thromboembolism. Therefore, many women use complementary and alternative medicines, namely clary sage oil, as safe treatment options to ameliorate menopausal symptoms. Clary sage oil is characterized by sclareol, an estrogen-like chemical that is considered the active ingredient of this essential oil. However, to our knowledge, no reports exist on the transdermal absorption of sclareol. In this study, we aimed to determine whether sclareol is absorbed transdermally and whether it has adverse effects on the liver.

【Materials and Methods】

Male HR-1 mice (8 weeks old) were randomly assigned to one of three groups: naïve control, jojoba oil-administered, and sclareol-administered. In the jojoba oil-administered group, jojoba oil (4 μL/g) was applied to the dorsal skin of mice. In the sclareol-administered group, a solution of 4 μL/g sclareol dissolved in jojoba oil and adjusted to 266,666 ppm was applied to the dorsal skin of the mice. Blood was collected via cardiac blood sampling before and 30 min after application. Sclareol concentrations in plasma and liver homogenates were determined using a Gas Chromatography-Mass Spectrometry apparatus. Plasma alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels were quantified using a BioMajesty ™ autoanalyzer.

【Results】

The concentrations of sclareol in the plasma and liver samples were 0.36 ± 0.08 and 1.69 ± 0.32 ppm, respectively. Furthermore, there was a significantly positive correlation between the plasma sclareol and hepatic homogenate sclareol concentrations. Moreover, the plasma ALT and AST levels did not change significantly among the three groups.

【Conclusion】

Our findings indicate that sclareol is absorbed transdermally and accumulates in the liver. In addition, the lack of changes in plasma ALT and AST levels among the three groups indicate that there was no hepatic damage due to the transdermal absorption of sclareol in HR-1 mice.