Acute Effects of Transdermal Administration of Jojoba Oil on Lipid Metabolism in Mice

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【Objective】

Aroma therapy is a complementary therapy using essential oils diluted with carrier oils. Jojoba oils have been widely used as carrier oils. However, limited information is available regarding their effects on blood biochemical parameters. This study aimed to investigate the effect of transdermal administration of jojoba oil on blood biochemical parameters in mice.

【Materials and Methods】

Eight-week-old male hairless mice were randomly divided into naïve control and treatment groups. In the treatment group, mice were topically administered 4 μL of jojoba oil, per gram of body weight, on the dorsa 30 min before euthanasia. Serum levels of albumin, blood urea nitrogen, creatine, uric acid, aspartate aminotransaminase, alanine aminotransaminase, alkaline phosphatase, creatine kinase, total cholesterol, triglyceride, phospholipid, non-esterified fatty acids (NEFA), low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, total bile acid, glucose, lactic acid, and total ketone body were quantified using a BioMajesty™ autoanalyzer. Gene expression was analyzed in liver, white adipose tissue, brown adipose tissue, skin, plantaris muscle, and heart via a real-time polymerase chain reaction.

【Results】

Serum NEFA levels increased significantly 30 min after topical application of jojoba oil ($p < 0.05$). No statistically significant changes were observed in other biochemical data. *Atgl* was significantly upregulated in the liver ($p < 0.05$), and *Atgl* upregulation in the liver was positively correlated with serum NEFA levels ($r = 0.592$, $p < 0.05$). Furthermore, a trend of decreased fatty acid trafficking-related gene (*FABPpm*, *FATP-1*, *FATP-3*, and *FATP-4*) expression in the skin after topical application of jojoba oil ($p = 0.067$, 0.074, 0.076, and 0.082, respectively) was observed.

【Conclusion】

Serum NEFA levels were elevated 30 min after transdermal administration of jojoba oil. This result shows that certain constituents of jojoba oil penetrate the skin. The mechanism underlying elevated serum NEFA levels might be comprised of both enhanced lipolysis via *Atgl* upregulation in the liver, and reduced fatty acid trafficking via *FABPpm*, *FATP1*, *FATP3*, and *FATP4* downregulation in the skin. Further studies are needed to clarify what constituents of jojoba oil can be absorbed transdermally.