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论著

人参总皂苷与丹参总酚酸配伍对急性血瘀大鼠血液流变性的改善作用

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摘要 目的 观察人参总皂苷 (EPG) 和丹参总酚酸 (ESM) 配伍对急性血瘀模型大鼠血液流变性的影响。方法 大鼠按分组分别ig给予EPG 200 mg·kg^{-1}, ESM 200 mg·kg^{-1}, EPG 200 mg·kg^{-1}+ESM 200 mg·kg^{-1}和阿司匹林 100 mg·kg^{-1}(阳性对照), 每天早晚各1次, 共7次。第5次给药后, 大鼠再sc给予肾上腺素加冰浴造成急性血瘀模型。锥板法测定全血黏度和血浆黏度; 光电比浊法测定二磷酸腺苷(ADP)诱导的血小板聚集; 光电电磁法测定凝血参数。结果 与正常对照组相比, 模型组大鼠全血黏度和血浆黏度升高, 血小板最大聚集率显著增加, 纤维蛋白原(Fib)含量显著增加, 凝血酶时间(TT)、活化部分凝血活酶时间(APTT)和凝血酶原时间(PT)均显著缩短(P<0.01)。与模型组相比, 单独应用EPG和ESM均能显著降低全血黏度和血浆黏度, 显著降低Fib含量, 显著延长APTT, 其中EPG还能明显延长PT和TT, ESM还能显著降低血小板最大聚集率。与单独应用EPG或ESM相比, EPG与ESM配伍组能进一步改善血液流变学指标, 在降低血小板最大聚集率方面显著优于单用EPG(P<0.05), 在延长TT方面显著优于单用ESM (P<0.05), 在降低Fib含量方面显著优于单用EPG或ESM(P<0.05)。与阳性对照阿司匹林相比, 单用EPG或ESM对血液流变性的改善作用不及阿司匹林, 但EPG与ESM配伍对血液流变的改善作用与阿司匹林相似, 但无统计学差异。结论 EPG和ESM单用能显著改善血瘀模型大鼠血液流变的异常, 且二者配伍后能进一步增强对血瘀模型大鼠血液流变的改善作用。

关键词 人参总皂苷 丹参总酚酸 血液流变学 血瘀 血小板聚集 全血凝固时间 纤维蛋白原

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Ameliorative effect of *Panax ginseng* saponins combined with *Salvia miltiorrhiza* phenolic acids on hemorheological abnormality in rats with acute blood stasis

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Abstract

OBJECTIVE To evaluate the effect of *Panax ginseng* saponins (EPG) combined with *Salvia miltiorrhiza* phenolic acids (ESM) on hemorheological abnormality in rats with acute blood stasis. METHODS The rats were randomly divided into normal control, model, EPG 200 mg·kg^{-1}, ESM 200 mg·kg^{-1}, EPG 200 mg·kg^{-1}+ESM 200 mg·kg^{-1}, and aspirin 100 mg·kg^{-1} (positive) groups. The rats were ig given corresponding drugs, twice a day, for consecutive 7 times. After the fifth administration, the rats were sc given epinephrin in ice water soaking to set up the acute blood stasis model. Whole blood viscosity and plasma viscosity were evaluated by cone-plate viscometer, hematocrit determined by micro-capillary method, platelet aggregation measured by photoelectric turbidimetry and coagulation parameters evaluated by optical electromagnetic method. RESULTS Compared with normal control group, whole blood viscosity and plasma viscosity of rats in blood stasis model group significantly increased; the maximum platelet aggregation rate was also remarkably elevated. Also, fibrinogen (Fib) content increased while prothrombin time (PT), activated partial thrombin time (APTT) and thrombin time (TT) decreased (P<0.01). Compared with model group, EPG 200 mg·kg^{-1} or ESM 200 mg·kg^{-1} alone could obviously decrease whole blood viscosity, plasma viscosity and Fib content, but significantly delay APTT (P<0.05, P<0.01). Meanwhile, EPG 200 mg·kg^{-1} significantly delayed PT and TT. ESM 200 mg·kg^{-1} significantly inhibited the epinephrin-induced platelet maximum aggregation rate. Compared with EPG or ESM alone group, EPG 200 mg·kg^{-1}+ESM 200 mg·kg^{-1} ameliorated the hemorheological abnormality further in rats with acute blood stasis, as revealed by

the greater platelet maximum aggregation inhibition (P<0.05, *vs* EPG), more delayed TT (P<0.05, *vs* ESM) and increased Fib content (P<0.05, *vs* EPG or ESM). Compared with aspirin group, EPG and ESM showed less inhibition on platelet aggregation while EPG+ESM exerted similar hemorheological improvement to aspirin, but there was no statistical significant difference. CONCLUSION The combination of EPG with ESM improves the hemorheological abnormality in rats with acute blood stasis, more powerful than EPG or ESM alone.

Key words saponins of *Panax ginseng* phenolic acids of *Salvia miltiorrhiza* hemorheology blood stasis platelet aggregation whole blood coagulation time fibrinogen

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