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Cardioprotective effects of β-sitosterol from *Linum usitatissimum* against isoproterenol-induced myocardial infarction in rats: A biochemical, electrocardiographic and histological features

Amal Derbali, Kais Mnafgui and **Abdelfattah Elfeki**
University of Sfax, Tunisia

Myocardial infarction (heart attack) is the irreversible death (necrosis) of heart muscle secondary to prolonged lack of oxygen supply (ischemia). The present study was designed to evaluate cardioprotective effect of β-sitosterol, the major sterol of flaxseed oil, *Linum usitatissimum*, against isoproterenol induced myocardial infarction in rats. The research started with evaluating the sterol composition of *Linum usitatissimum*. Then, studying cardiovascular protective effect of its major sterol, β-sitosterol is based on cardiac damage markers especially electrocardiographic changes, histopathological modifications, troponin T and total cholesterol serum level. According to chemical analysis, this extract is composed essentially of stigmasterol (10.45%), avenasterol (13.30%), campesterol (25.33%) and β-sitosterol (44.08%). Male rats were randomly divided into four groups namely control (C), isoproterenol (ISO), isoproterenol treated group with clopidogrel (0.1 mg/kg body weight of clopidogrel/day) (CLO+ISO) and group treated with β-sitosterol (40 mg/kg body weight/day) (BS+ISO). Isoproterenol injection showed changes in electrocardiographic patterns, including ST-segment elevation. It caused the increase of the serum levels of troponin T and other cardiac injury biomarkers with anti-hypertensive effect through inhibition of angiotensin converting enzyme serum level. It also leaded to the appearance of edema and necrosis in myocardial tissue. However, β-sitosterol pre-co-treatment prevented almost all the parameters of isoproterenol-induced myocardial infarction in rats. To conclude, β-sitosterol, which is the active sterol of flaxseed oil, has a significant cardioprotective effects against isoproterenol-induced myocardial infarction.

derbaliamal801@yahoo.fr

Genotoxic/anti-genotoxic activities of *Clematis flammula* extracts

Atmani Dina[1], Tahiri Ouahiba[1], Debbache-Benaida Nadjet[1], Ayouni Karima[1], Berboucha Meriem[1], Saidene Naima1, Charid Imene[1], Frederic Amant[2, 3, 4] and **Stefanie Schrauwen[2, 3]**
[1]Université de Bejaia, Algeria
[2]University of Leuven, Belgium
[3]University Hospital Leuven, Belgium
[4]Antoni van Leeuwenhoek-Netherlands Cancer Institute, Netherlands

Clematis flammula leaf extracts are widely used in folklore medicine in Algeria to treat anti-inflammatory disorders and anticancer potential. Validation of the use of medicinal plants should also shed the light on their safety, based on the lack of their cytotoxicity and genotoxicity. The aim of our study was to assess the cytotoxicity and genotoxicity/anti-genotoxicity of the plant leaf extracts by the Allium cepa root test. In the same context, we tested their anticancer potential on two ovarian cancer cell lines OVCAR3 and A2780. Morphological observations of Allium cepa root cells after treatment by 100 and 300 µg/kg of *C. flammula* leaf extracts, sodium azide and a mixture of both have revealed that an absence of toxicity was observed for the plant extracts contrary to sodium azide. However, the combination of *C. flammula* extract at 300 µg/ml with sodium azide has induced a shortening of the root bulb (ΔL between – 1.22 mm and 0.02 mm) associated with marked changes in color, form, and consistency. Similarly, the mitotic index (MI) was impacted by sodium azide (100 µg/ml) especially in prophase but not with the extract (100, 300 µg/ml). The results are confirmed by the increase of chromosomal aberrations (C-mitosis, anaphase bridges and micronuclei) following sodium azide treatment. On the other hand, the MTT test indicated that survival of ovarian cancer cells (OVCAR3) was reduced to half at 10 µg/ml after 72 h which was less effective than that against A2780 of which survival was reduced to almost 30% at the same concentration and time scale. Bioactive compounds were identified by HPLC-MS.

dinaatmani88@yahoo.com