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Cardioprotective effect of the root extract of *Hemidesmus indicus* against doxorubicin -induced oxidative stress in mice

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ABSTRACT

The aim of this work was to investigate possible ameliorative action of *Hemidesmus indicus* root extract (HiRe) against doxorubicin (Dox) induced toxicity. HiRe was administered 14 days before doxorubicin (25 mg/kg.b.wt) administration. Mouse in all groups was sacrificed 24 hrs after doxorubicin injection. Serum markers of heart injury –LDH, CPK, SGOT and SGPT levels, which were markedly increased by doxorubicin treatment, were decreased to normal levels by HiRe pre-treatment. Antioxidant enzymes-SOD, CAT and GPx, as well as GSH levels in heart tissue decreased drastically after doxorubicin injection. HiRe pretreatment elevated these levels significantly. Oxidative stress markers in heart tissue, which were high in control animals, were decreased significantly by HiRe pretreatment. The biochemical changes were consistent with histopathological observations, suggesting that *Hemidesmus indicus*, due to its antioxidant properties significantly reduced the oxidative stress and thereby toxicity induced by doxorubicin.

Key words: Cardiotoxicity; doxorubicin; *Hemidesmus indicus*; antioxidant.

INTRODUCTION

Although conventional method of treating cancer using chemotherapy has yielded significant clinical benefits, its full therapeutic effectiveness is masked by severe side effects. Doxorubicin (Dox) is an anthracycline antibiotic most widely used in the treatment of wide range of cancers including hematological malignancies, many types of carcinomas and soft tissue sarcomas [1, 2]. However, the clinical use is restricted due to its specific toxicities to cardiac tissues [3]. The Dox-induced cardiotoxicity has been shown to be mediated through different mechanisms, including membrane lipid peroxidation, free radical formation, mitochondrial damage and decreased activity of Na⁺-K⁺adenosine triphosphate [4]. This compound inhibits topoisomerase II by intercalating DNA with high affinity and stabilizes the DNA double strand breaks. Additionally, the quinone structure of anthracycline enhances the catalysis of oxidation – reduction reactions, thereby promoting the generation of oxygen free radicals. Due to the lack of developed antioxidant defence system, these free radicals produced by electron transfer from the semiquinone to quinone moieties of the anthracycline are responsible for myocardial damage and subsequent doxorubicin induced cardiotoxicity [5].

Many studies have shown that natural products because of their safety profiles and powerful antioxidant constituents may be useful in the protection of doxorubicin induced cardiotoxicity [6, 7]. *Hemidesmus indicus* Linn. belongs to the family (Apocynaceae) [8], commonly referred to as Indian sarsaparilla, Anantamool or Nannari is a commonly available perennial climbing plant, used as the main ingredient in the preparation of the cool and refreshing drink Nannari sherbat. It is a native of India and also found in south tropical Asian countries such as Pakistan and Sri Lanka [9]. *Hemidesmus indicus* is a well known medicinal plant used for antioxidant and anti-inflammatory diseases