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Prevention from Doxorubicin Cardiotoxicity by Available Protective Agents in Iran

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Abstract

Doxorubicin, used in pediatric chemotherapy regimens, has cardiotoxic effects. Dexrazoxane is co-administrated with doxorubicin to prevent its cardiotoxicity. Here we have explored some alternative food or drugs to be used in absence of dexrazoxane since it's not readily available in Iran at this time.

Keywords: Pediatric, chemotherapy, doxorubicin, cardiotoxicity, dexrazoxane, Iran.

Introduction

Dear Editor:

Doxorubicin cardiotoxicity during pediatric chemotherapy is a matter of great concern. Dexrazoxane is a cardio protective iron chelator, co-administrated with doxorubicin to prevent its cardiotoxicity, which interferes with reactive oxygen species production but is not readily available in Iran. Here we suggest some potential alternative methods to reduce the cardiotoxicity of doxorubicin.

It has been suggested that exercise protects against the detrimental side effects of doxorubicin in cardiac myocytes, in part, by protecting mitochondria against doxorubicin -mediated damage [1].

Tomato effectively lowers the risk of reactive oxygen species mediated side effects, such as cardiovascular disease and cancer, by improving the antioxidant capacity [2]. Also it is a rich source of lycopene, an antioxidant carotenoid reported to be a more stable and potent singlet oxygen quenching agent compared to other carotenoids [2]. In addition to its antioxidant properties, lycopene have biological effects including cardio protective, anti-inflammatory, anti- mutagenic and anti-carcinogenic activities [2].

Phytochemicals are chemical compounds that occur naturally in plants such as grapes, garlic, tomato, spinach, and beet root, which could decrease the risk of chemotherapy related heart failure [3]. Melatonin (a hormone synthesized by the pineal gland, but also present in many edible plants); has been suggested to have cardioprotective effects. Chalcones (precursors of all known flavonoids), vitamins A, C, E, selenium, and semisynthetic flavonoid 7-mono hydroxyethylrutoside might also have protective properties [3].

Iron chelating drugs have been suggested to reduce the toxicity of anthracyclines and deferoxamine as well as triapine, have reached the stage of clinical testing or application 4. Deferiprone (L1) has been also shown to be effective in the inhibition of doxorubicin-induced cardiotoxicity [4]. Liver toxicity and potential neutropenia are two limitation factors for its use in cancer patient especially in combination with hepatotoxic chemotherapeutic agents.

Coenzyme Q10 has been shown to have cardioprotective effects [5]. Vitamin E suspends progression of the heart muscle damage over the time, but vitamin E did not attain any cardio protection against doxorubicin and cyclophosphamide in combination [6]. Soy protein or sesame seeds or a combination of both reduces elevated cardiac disease biomarkers caused by adriamycin in rats [7]. Also fish omega-3 fatty acids may be a suitable cardio protective agent against acute toxic effects of dexrazoxane [8].

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Conclusion

Exercise during doxorubicin chemotherapy might reduce the cardiotoxicity of doxorubicin.

Some foods (soy / sesame combination, grapes, garlic, tomato, spinach, and beet root), edible plants, chalcones, selenium, semisynthetic flavonoids, L-carnitine, fish Omega-3 fatty acids, and coenzyme Q10 might be helpful in prevention of doxorubicin-induced cardio toxicity in Iran in absence of dexrazoxane. Some Iron chelating drugs might also be promising in this regard.

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