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Toxic Effects of Low Concentration of Cyanotoxin (Microcystin-LR) on Mice and Study of Protective Efficacy of the Antioxidants Vitamins (C&E) and Capparis spinosa L. Root Extract

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Abstract
In this study the protective efficacy of vitamin C&E and ethanolic extract roots of *C.spinosa* against toxic effects of algal toxin (Microcystin –LR) in mice were done .Results showed significant decreasing $p \leq 0.05$ in values of hemoglobin (HB) and packed cell volume (PCV) reach to 7.77 and 27.23 g/l in blood of mice treated with low concentration of cyanotoxin (MC-LR = 0.15 ug/kg/day) compared with control group which reach to 12.21 and 40.22 respectively. Significant increasing were showed in some liver enzymes ALT,AST and ALP when exposed to toxin only which reach to 68.80 , 167.85 and 274 U/l respectively compared with control group , While groups treated with vitamins and extract showed non -significant differences with control group in values of blood parameters and enzymes. Histopathological changes in liver when group treated with toxin only represented by pyknotic hepatocyte , hypertrophy , binucleation , infiltration of lymphocyte, karyolysis. While kidney showed hypertrophy of cell glomerular arterioles , metaplasia of squamous epithelial tissue of bowman capsule wall in to cuboidal, hypertrophy of renal tubules cells , hyperplasia , also results showed the important role of vitamin C&E and root extract of *C. spinosa* to keep the normal values of blood parameters and prevent histological changes as control group.
Keywords: Algal toxin (Microcystin-LR) , protective efficacy of Vitamin C&E , *C.spinosa*

1. Introduction

Microcystin (MCs) are toxins produced by cyanobacteria (Blue- green algae)from water environment that can induce acute and chronic effects on humans and animals after ingestion /contact with contaminated water (Funari and Testai , 2008; Codd,1995;Dawson, 1998; Pouria *et al*, 1998), or concentration in plant tissue and inhibition of growth (Mmitrovic *et al*.2005) and can potentially transfer in to human and animals via food chains (Crush *et al*.2008). Microcystins are structurally drives cyclic heptopeptides that are primarily considered as heptotoxins (WHO,2008) although the gastrointestinal tract, kidney and other organs are also susceptible to mediated damage (Falconer,1996 ; Al-Sultan and Al-Ali , 2010 ; Al-Ali *et al*., 2011).

Microcystins have proved to be highly potent hepatotoxins in mammals and fish (Fisher and Dietrich,2000; Towner *et al*.,2002 ; Al-Sultan , 2007 ; Al-Aarajy and Al-Sultan 2008 ; Al-Ali *et al*., 2011). It is well recognized that among their toxigenic mechanisms they are potent inhibition of protein phosphatase 1 and 2A that cause increased protein phosphorylation which is directly related to their cytotoxic effects and tumor-promoting activity (Hosser *et al*, 1989; Carmichael,1994;Hooser, 2000) . The Liver play a pivotal role in metabolism,secretion and storage. Any injury to liver can result in many disorders ranging from transient elevation in liver enzyme to life threatening liver cirrhosis and hepatic failure. The common causative agent of liver injuries are toxic chemicals(Nasin Agh *et al* ., 2007) . Therapeutic drugs (Abd Al Majeed and Mustafa, 2010) alcohol, microbial agents(Subramonium and Pushangadan, 1999) metals (Almecola *et al*., 2002, Abd Al Majeed, 2010) and microcystin from cyanobacterial (Angeles *et al* 2003; Jos, 2005; Moreno, *et al*., 2004 ; Al-sultan , 2010 ; Al-Sultan and Al-Ali 2010 ;Al-Sultan *et al*., 2015)) and various pesticides (Sayeed *et al*., 2003).

Vitamin C also known as ascorbic acid (AA) and α-tocopherol (Vitamin E) are potent antioxidants and non-enzymatic defenses that capable to reduce oxidative damage by augmenting the function of endogenous free radical scavengers such as superoxide dismutase, catalase and glutathione peroxidase (Filho.,1996; Whitehead and Keller,2002; Son *et al*,2004; Ayo *et al* .,2006; Suteu *et al.,* 2007). A few papers have reported that a combination of vitamins E and C can reduce lipid peroxidation(LPO) caused by toxic substances (Appenroth *et al*.,1997; Gultekin *et al*., 2001; Irfan Altuntas *et al*.,2002).

Capparis spinosa L. (caper) (family Capparidaceae) is plant from dry regions in the west and central Asia and widely grown particularly in Mediterranean basin. From ancient time Greeks and the Romans were used for medicinal purposes. Capers were employed as a flavorings in cooking, also used in traditional medicine for their diuretic, antihypertensive poultice and tonic properties (Baytop, 1984; Calis*, et al*., 1999;Eddouks, *et al* 2004) . Capers are said to reduce flatulence and to be anti-rheumatic in effect. In Ayurvedeic medicine capers are recorded as hepatic stimulants and protectors, improving liver function, hepatotoxic activity and potential antioxidant (Moghaddasian, *et al*.,2012; Baijal, 2004; Sandhir and Gill,1999;Mishra,*et al*.,2007; Abd Al Majeed and Mustafa.2010;Gadgoli and Mish ,1999). Capers have reported uses for arteriosclerosis, kidney sources of novel antimicrobial compounds especially against bacterial pathogens and new research suggest a possible use of