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Research Article

PHYTOEXTRACT PLAYS PROTECTIVE ROLE IN THE OXYGEN CONSUMPTION IN THE FRESHWATER BIVALVE, *PARREYSIA CYLINDRICA* AGAINST HEAVY METAL TOXICOSIS

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ABSTRACT
The present study describes protective role of *coriandrum sativum* L. extract against lead chloride induced toxicity in an experimental model, the fresh water bivalve, *Parresiya cylindrica*. The effect of bivalve was studied under three groups. Group A was maintained as control, Group B bivalve were exposed to chronic LC $_{50}/_{10}$ doses of lead chloride (5.209ppm) for 18 days, while group C bivalve were exposed to respective chronic concentrations of heavy metals with 5 ml/lit of extract from *coriandrum sativum* L. Rates of O_2 consumption from above three groups were estimated after 6, 12 and 18 days. Remarkable decrease in the rate of O_2 consumption was observed in lead exposed bivalves. The groups exposed to heavy metals along with extract from *coriandrum sativum* L. showed more rates of oxygen consumption than those exposed to heavy metals. The probable protective role of extract from *coriandrum sativum* L. is discussed in the paper.

Keyword: *Lead, Phytoextract, Protective Role, Parresiya Cylindrica and Oxygen Consumption*

INTRODUCTION
The heavy metals enter in to the body of animals including man through the non vegetarian and vegetarian diet and drinking water and accumulate in the tissues. Studies confirm that heavy metals can directly influence the behavior by impairing mental and neurological function influencing neutorransmitter producton and utilization and altering numerous metabolic body processes. Heavy or toxic metals are trace metals with a density at least five times that of water. As such, they are stable elements meaning they can not be metabolized by the body and bio-accumulate, usually react with proteins and interfere physiological activities and thus increases the risk of life in various ways. They are difficult to remove from body. Heavy metals have high biological activity and have a tendency to accumulate in organism, Making adverse effects possible at very low levels of expossure. Heavy metal affect the rate of respiratory metabolism for which oxygen is the most essential factor. Heavy metals are recognized as a strong biotoxicants, because of their persistent nature and cumulative action to the aquatic flora and fauna (Sharma and Agrawal, 2005).

In the aquatic invertebrate, Beaby and Eaves (1983), observed that molluscs can accumulate higher concentration of metal ions than other groups of invertebrates. Accordind to the WHO (1995), the nonessential metal lead (Pb) occurs in the environment as a consequence of both natural and anthropogenic processes, with mining and smelting, coal burning, cement manufacturing, and use in gasoline contributing most to Pb contamination of aquatic environments. Lead (Pb) is a natural constituent of the Earth's crust, and is commonly found in soils, plants, and water at trace levels. Occurrence of metallic lead in nature is rare. The main ore minerals of lead are galena (PbS) and cerussite ($PbCO_3$); anglesite ($PbSO_4$) and pyromorphite ($Pb5\ (PO4)_3Cl$) are less important, but occur frequently (Crook, 1921). The heavy metal accumulation at the cellular level is capable of interacting with many biological legends and interferes with different mechanisms (Gurd and Wilcox, 1956). Lead toxicity is currently one of the serious problem world wide, there is still no specific, reliable and safe treatment. Several metal chelators (CaNa2EDTA and DMSA) have been used to manage lead toxicity in the event of exposure but none are suitable in reducing lead body burden (Osweiler, 1999). Heavy or toxic metals are trace metals that are at least five times denser than water. As such, they are stable elements in that they

cannot be metabolised by the body, as well as bio-accumulative in that they are passed up the food chain to humans.

Thus, there has been an increased interest in the therapeutic potential of plant products or medicinal plants having antioxidant properties in reducing free radical-induced tissue injury (Gupta & Flora, 2005). *Coriandrum sativum* L. (Coriander), belonging to family Umbelliferae, is a herb that is widely cultivated in India and is recognized for its carminative and cooling properties (Sairam, 1998). It is well known that herbs and spices possess antioxidant activity (Madsen & Bertelsen, 1995; Schwarz *et al.,* 2001; Tanabe *et al.,* 2002).

Coriander suppresses the deposition of lead by chelating the metal (Aga, 2001). It was shown that coriander extracts have phenolic compounds and flavonoides, suggesting that these compounds contribute to the antioxidative activity (Helle Wangensteen, 2004). A sorbent prepared from coriander was found to have good efficiency in removing organic and methyl mercury from aqueous solutions (Karunasagar *et al.,* 2005). Coriander has been reported to exhibit several pharmacological effects such as as antifertility (Al-Said *et al.,* 1987).

This study was carried out to investigate the probable protective role of extract from *coriandrum sativum* L (coriander) extracts on physiology of oxygen consumption of lead chloride intoxicated in an experimental model, the fresh water bivalve, *Parresiya cylindrica.*

MATERIALS AND METHODS

Preparation of Aqueous Extract of *Coriandrum Sativum*

The plant *Coriandrum sativum* L (1 kg) *was* collected from a local market in savda, Tal – Raver, District - Jalgaon (M.S.), India. The dried coriander leaves were ground to a fine powder and were extracted with boiling water (5 L) for 30 min by Soxhlet technique. The filtrate was evaporated at < 70 ^{0}C in a vacuum dryer to give a final yield of 108.69 g. was stored at 4 ^{0}C. It was dissolved in distilled water whenever needed for experiments.

Healthy active animals of approximately same size and weight were chosen. The acclimatized active bivalve were divided into three groups, such as group A, B, and C. The group A of acclimatized bivalve was kept as control set. The group B of acclimatized bivalve was exposed to chronic concentrations (LC_{50} value of 96 hr/10) of heavy metal salt $PbCl_2$ (5.209ppm) as chronic doses up to 18 days, while group 'C' of acclimatized bivalve was exposed to chronic concentration (LC_{50} value of 96 hr /10) with 5 ml/lit extract from *coriandrum sativum* L. up to 18 days. During experimentation bivalve were fed on fresh water algae. O_2 consumption by bivalve from all groups was determined by Wrinkler's method after every 6 days.

RESULTS AND DICUSSION

Parresiya cylindrica after exposure to concentration of lead chloride (5.209ppm) along with extract from *coriandrum sativum* and during recovery have been summarised in table.

It was observed that after chronic treatment of lead chloride upto 18 days to, *Parresiya cylindrica* the rate of oxygen consumption decreased significantly as compared to control bivalve. Oxygen consumption data from table indicates that, the rate of oxygen consumption in presence of $PbNO_3$ (5.209 ppm) decreased with the increase in exposure period. The rate of O_2 consumption was more in $PbCl_2$ and extract from *coriandrum sativum* exposed bivalve as compare to those exposed to only $PbCl_2$ in respective period of exposure.

Discussion

Heavy metals affect the metabolism of the freshwater bivalve, *Parresiya cylindrica.* Alterations in metabolic processes following exposure to heavy metal stress have always been used as indicator of stress.

But there is a vast difference in the pattern of metal induced physiological alterations from metal to metal & animal to animal.After chronic treatment, the rate of O_2 consumption was decreased in lead chloride exposed animals.

Table (A): The Rate of Oxygen Consumption of *Parresiya Cylindrica* after Chronic Exposure to Heavy Metal Salt, $PbCl_2$ with and without 5ml/lit. Extract of *Coriandrum Sativum*

Treatment	Average O_2 Consumed ml/gm/hr/lit. ± S.D.		
	6 Days	12 Days	18 Days
(A) Control	0.1278 +0.001	0.1221 +0.002	0.1201 +0.008
(B) 5.209 ppm $PbCl_2$	0.1256 +0.003 (-1.86 %)	0.1199 +0.001 (-1.96 %)	0.1179 +0.002 (-1.90 %)
(C) 5.209 ppm $PbCl_2$+ 5ml/lit. extract from c. sativum.	0.1272 +0.004 (-0.50 %)	0.1214 +0.001 (-0.62 %)	0.1199+0.001 (-.018 %)

Figure in bracket indicates percent variation in the rate of O_2 consumption.

Lomte and Jadhav (1982) showed in *Corbicula regularis* that the rate of O_2 consumption decreased in different concentrations of toxic compounds, such as $CuSO_4$, Sodium Cynide etc. Kapoor and Lomte (1987) found inhibition in oxyregulatory mechanisms due to heavy metals. The decrease in respiration after long exposure was noted in *B. bengalensis*.

Sabahat saeed and Perween tariq (2007), studied and suggested that, the antibacterial activities of aqueous infusion and decoction of *C. sativum* were also evaluated. Chaudhry & Tariq (2006) was found that decoction of *C. sativum* does not have antibacterial potential against G +ve and G -ve bacteria. Similarly, aqueous decoction of coriander was found to have no bactericidal activity against *Helicobacter pylori* (O'Mahony *et al.*, 2005). In contrast, some workers have found that *C. sativum* has strong antibacterial activity against G +ve and G –ve (Al-Jedah *et al.*, 2000). Similarly, the compounds aliphatic 2E-alkenals and alkanals, isolated from the fresh leaves of *C. sativum* were found to possess bactericidal activity against *Salmonella choleraesuis* (Isao *et al.*, 2004).

Leena Kansal *et al.*, (2011) studied the protective role of Coriandrum sativum extract against lead and suggests that aqueous and ethanolic extracts of *Coriandrum sativum* can prevent or slow down the oxidative damage induced by lead in mice. The effect of lead on LPO level, GSH concentration, antioxidant enzyme activity and some biochemical variables were reversed by treatment with plant extracts.

Dr. Omura (1995), has discovered that the herb cilantro will detoxify mercury from neural tissue, is used to help stimulate the appetite and relieves minor digestive irritation. This is a remarkable discovery. It is a novel technique, which greatly increased our ability to clear up recurring infections, both viral and bacterial.

Bioactive Cilantro blend is an inexpensive, easy way to remove (or chelate) toxic metals from the nervous system and body tissues. Coriandrum sativum (coriander) has been reported to have a number of possible medicinal attributes including antispasmodic, carminative and stomachic properties (Alison and Peter, 1999).

In present study, in the bivalve, *Parresiya cylindrica*, the rate of O_2 consumption was observed to be decreased in chronic concentration of $PbCl_2$ as compared to the control and $LC_{50}/_{10}$ $PbCl_2$ with 5 ml/lit of aqueous extract of *Coriandrum sativum.* Due to lead chloride doses may cause severe disturbances of the metabolism in the animal.

Those bivalve exposed in $LC_{50}/_{10}$ $PbCl_2$ with 5 ml/lit of aqueous extract of *Coriandrum sativum* showed, O_2 consumption.

Conclusion

In conclusion the current study suggests that aqueous phytoextracts (*Coriandrum sativum)* can protect or slow down the oxidative damage induced by lead chloride in *Parresiya cylindrica*. The effect of lead on oxygen consumptioin is variables were decrease by treatment with phytoextract. This is indicates to that, The *Coriandrum sativum* extract posses protective ability.

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